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# MODEL AIRPLANE NEWS

NOVEMBER, 1943 VOL. XXIX, No. 5

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# FLASH NEWS

SO NOW Italy has unconditionally surrendered to the Allies and become the first of the three Axis partners to go down in defeat. Expected, forced, inevitable the capitulation was, and certainly no surprise to the United Nations for Generals Eisenhower, Montgomery and Alexander can certainly claim: "We planned it that way." The position of Italy as the weakest link in the triangular chain of the Axis does not minimize the significance of its surrender, for the Allies now gain considerable military advantages and tremendous psychological gains. Militarily we gain the seven battleship and sundry cruisers and destroyers of the Italian Navy, 1,500,000 tons of Italian shipping (a great windfall, particularly in the Mediterranean) and, most important of all, strategic bases for Airpower from which we can strike at satellite industries and strongholds in the southern and southeastern Reich. Great portions of Nazi industry have been moved to new sites in Austria, Hungary and Czech-slovakia, all portions of which are now in easy bombing range, a short enough range actually to provide necessary fighter escort, vitally needed in operations opposed by the Luftwaffe. The battle is not over and the greatest part of the fighting is yet to come but with Italy's surrender on September 8, 1943 comes the beginning of the end.

Admiral Chester W. Nimitz, Commander of the Pacific Fleet of the United States Navy, has revealed that the new Grumman F6F-1 Hellcat fighters saw action for the first time in the carrier-based aerial attack on Marcus Island. No fighter opposition was encountered over the island which prevented the new Hellcats from exhibiting its fighting prowess. According to Nimitz this was the first use of carrier-based fighting planes in a night ground-strafing attack. He expressed his approval of the new craft, slightly larger and far more powerful and deadly than the preceding Wildcat, and anticipates considerable use of them in the very near future.

The Luftwaffe has returned with renewed vigor but broken strength to the attack, a well-nigh hopeless task. There is little mystery to the question: "Where is the Luftwaffe?" which refers to that gigantic armada that assaulted Britain, resisted Montgomery in Africa and defended skies over Russia. The Luftwaffe, a major portion of it, is simply no more. Losses sustained in action have accounted for a considerable percentage of the cracking of its strength but the tremendous aerial assaults on Germany's factories have accounted for the greatest portion of its sunken splendor. Its chief enemy has not been Allied fighters as would normally be expected under the old concepts of aerial tactics: it has been the bomber, most particularly the Boeing Flying Fortress, that has sounded the death knell of the Luftwaffe's fighter force. With World War I as a pattern, there were few last year who believed other than that the German fighter would be the greatest enemy of the Allied bomber. But the situation has reversed itself, as have so many pre-war concepts in this World War II, and the bomber has become the chief marksman sending Messerschmitt and Focke-Wulf single-seaters to the ground as wreckage. The memory of the American Eighth Air Force in England, after this war, will forever remain a monument to the death of the fighter plane and the resurgent strength of the bomber plane as the prime aerial tactical weapon. The American .50 caliber machine gun, the most successful weapon of this war, has attended the demise of the fighter plane, installed in a multitude of ways in the modern bombers. Fixed, flexibly mounted and in power-driven multi-gun turrets, this rapid-firing, hard-hitting weapon has turned the tables on the tacticians and wrought a symbol of victory for the bomber from the molten remains of the fighter.

According to the statements of captured Nazi pilots, who have been brought to this country for internment, Col. Gen. Ernst Udet, 2nd ranking German "ace" of World War I and director of research and procurement of the Luftwaffe, shot and killed himself in mid-air while at the controls of a Messerschmitt. This contradicts Berlin reports that the high-ranking flying officer died in the accidental crash of the machine last year.

The race for post-war airlines is on with a vengeance and out of this maelstrom of applications must come a fair and equitable apportioning of the juicy plums of passenger-miles that will be doubled and trebled the world around with the coming of peace. The groundwork for a tremendous expansion of international air routes has already been lain with the vast facilities of the Army Air Forces' Air Transport Command, now larger than all the world's peacetime airlines combined, established and in full operation. It will be impossible for the Government to award permits without showing favoritism, and this favoritism will bring down the greatest cataclysm of criticism and name-calling, if not court action, our domestic airline scene has witnessed. When reference is made in the current press to "the battle of the airlines" and the "struggle for routes" we might be reminded that "they ain't seen nothing yet!"

Theoretically, airline routes will be awarded to those firms who are best

*(Continued on page 36)*

# "War Babies from Mars"

## OWN THESE LIFE-LIKE MODELCRAFT FLYING MODELS!

Looking through an early issue (1929) of an aviation dope sheet, I came across a page of drawings titled "War Babies from Mars—Fighting Planes of the Future." Well, modelers, you'd be surprised how well those designers hit the nail on the thumb! Fighting ships today look almost exactly like those pioneer airmen prophesied they would twenty years ago!

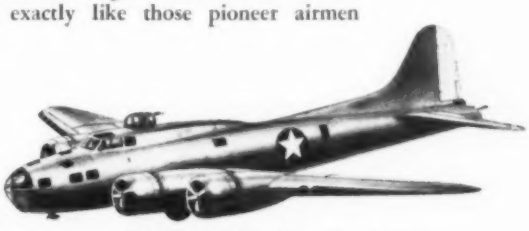
### CATALINA PBY
FLYING BOAT

It's a beauty! This built-up flying model of the famous Catalina Bomber. It's one of the reasons the Japs crawled off the Aleutians on their yellow bellies. Scale 1/4" to foot.

**$1.95**

Add 15c Postage

Just an idea, but why not build a snappy model for your best pal as a Christmas gift? It won't be long, now!



### BOEING B-17
FLYING FORTRESS

Though you search everywhere, you'll find none can compare with Modelcraft's version of the B-17. Scaled 1/4" to the foot—nearly 27" wingspread—and crystal-clear plans.

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### TODAY'S SERMON
By Barney

Noted an item in this mag last month about ranks of modelers being depleted by so many going into the armed forces. Fine—and we're proud of them—but that leaves a big gap that you guys left behind will have to fill. So get the lead out. If your turn comes to "join up" you'll make faster, better progress because of knowledge you gained through modeling.

### RYAN TRAINER

One of the reasons we have the world's best pilots. 3/4" Scale

**$1.00**

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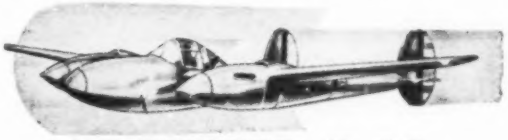
### CLEAR OVER THE MOON

That's where we're kicking the little paperhanger from Austria and the sons o' the settin' sun! And the part that modelers have played in making Victory possible cannot be overestimated. Keep up the good work! Depend on Modelcraft to give you the very best models and the biggest variety.



### LOCKHEED P-38
LIGHTNING

"Call it Lightning" said the pilots after they'd sent it leaping into the stratosphere—then screaming down the sky "like forked vengeance." No modeler's display is complete without a P-38. Here's a knockout flying model with 38" wingspan.

**$1.50**

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### THE JAP ZERO

"Know your enemy" is an army rule. Here's a detailed 3/4" scale model of the slap-happy jappy bid for air supremacy. Be the first in your crowd to build this dandy flying model Zero.

**$1.95**

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They can take OUR NAME but they can't DUPLICATE our MERCHANDISE!

**SHOW THIS TO DAD!**

Dad, that boy of yours will get a big kick out of helping YOU build a model plane. It'll help you become better pals, too! What's more—it's grand fun!

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**AW—SHE'S A GIRL!**

All right—but girls have built some of the sweetest models we've ever seen! So, sister—get in the swim—order out a kit or two and show up that brother!

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# THE DRAFT AND YOU

We are in a hard war . . . IF YOU ARE 16 or 17 . . . you have the opportunity of a lifetime. Help your country to VICTORY and at the same time TRAIN yourself for a CAREER in Aviation. See Curtiss-Wright Technical Institute ad on page 5—MAIL COUPON TODAY and include your birth date, for vital information

# SUPER-CYCLONE OWNERS

As previously announced, the manufacture of the SUPER-CYCLONE was suspended in April, 1942, for the duration of the war. We have no more engines for sale. The resources of this Company and affiliated Companies are devoted to the winning of our peace. When this is achieved, our engineers will again develop the same high-quality engines we have manufactured in years past.

While, during this period of suspended manufacture, we cannot render to you engine-owners our customary engine repair service we still have many of the replacement items in stock. Send for your copy of our up-to-date Parts List and keep your present Cyclone in service.

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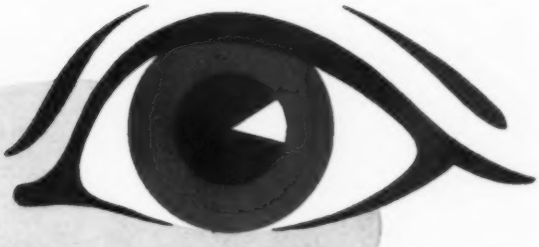
# .... with an  TO THE FUTURE

MEN! Can you see the great future in post-war aviation? To the man with an eye to the future, NOW is the time to prepare yourself for the greatest opportunity of a life time, in America's most promising industry . . . American Aviation.

Successful careers, like winning wars, are carefully planned. They just don't happen . . . WHAT ABOUT YOUR FUTURE? . . .Will YOU be prepared to take full advantage of this opportunity in after-the-war aviation? If so, you must get the best training and DO IT NOW.

CURTISS-WRIGHT TECHNICAL INSTITUTE, with its proved, tested and directly planned courses, offers you this best highly specialized training in Aeronautical Engineering and Master Aviation Mechanics.

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The high standing of CURTISS-WRIGHT TECHNICAL INSTITUTE is indicated by Mr. Donald Douglas, President of the great Douglas Aircraft Company, in choosing this school for his own son's training. In addition, this school was chosen to train Army Air Force mechanics by our government in 1939, long before the war.

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## The story of the U. S. Navy's carrier based fighters—their design and development

*by* **ROBERT McLARREN**

UNITED STATES Naval Aviation today is the finest service of its type in the entire world and no other nation dares claim equality with it in even minute, detail respects. In the adaptation of the airplane to the sea our Navy is the leader of all others but this enviable position among the nations, enemy and friend alike, has not been gained nor maintained without sacrifice, devotion and enormous effort. The problems accompanying the successful integration of the airplane with the navy are manifold and many, even today, have not been completely overcome. But the principles have been mastered and the progress of this branch of national security, most particularly in the past two years, has wrought changes in the basic concepts of military and naval science and tactics in not only our own navy but most particularly in the navies of our enemies. The Japanese fleet, to date, has not dared the power of our sea-going aerial forces full scale and has come out badly in encounters with it in reduced scale operations. The Italian Navy has suffered untold losses from Allied naval aviation and the greatest blows struck at the German Navy have been from the air.

Without air power, navies no longer sail the seas with security. Without air power the modern navy is useless. It has taken thirty years to develop this power for there was no naval air power in the summer of 1910 when Captain Washington Irving Chambers was ordered from command of the U.S.S. Louisiana to duty with the Navy Department in Washington, D.C. His orders were to keep the Department informed of aviation progress and to investigate the possibilities of the airplane operating with the fleet. His observation of the many machines skilfully piloted at the Belmont Park aerial meet in October, 1910 convinced him of the airplane's possibilities and he became determined that the United States Navy should have one!

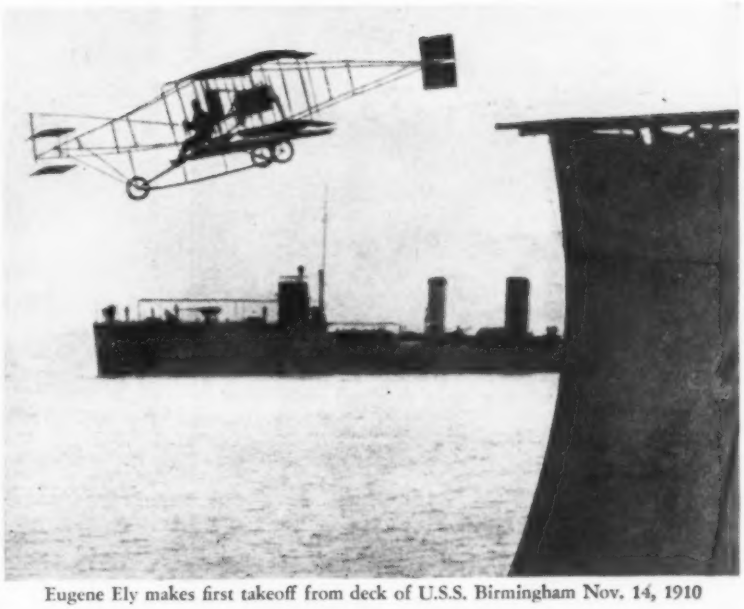
At this time the *New York World* suggested the possibilities of flying an airplane from the deck of a ship and youthful Glenn Curtiss, of Hammondsport, New York, saw the publicity value of such a stunt in his attempts to sell a machine to the Navy department. One of his pupils, J.A.D. McCurdy, was chosen for the attempt and a platform was prepared on the deck of the Hamburg-American liner *Pennsylvania*. With everything in readiness the stunt was cancelled when the propeller on the Curtiss Pusher was damaged. Captain Chambers immediately grasped the opportunity and the armored cruiser *Birmingham*, at Hampton Roads, was prepared for the test. Eugene Ely, a civilian pilot, graduate of the Curtiss group, volunteered for the attempt after Chamber's persuation. The Curtiss Pusher was hoisted onto the platform on the forecastle of the *Birmingham* and the cruiser headed down the bay at 10 knots. Ely warmed the four-cylinder engine, pulled his goggles down over his cap and nodded to his mechanic. With a platform only 83 feet long and 24 feet wide in front of him, Ely gunned the motor and the fragile plane moved forward. The craft rocked across the boards and into the air with Ely feverishly working the controls. The 37 ft. drop from the deck to the surface of the water wasn't enough and the wheels kicked up a spray, drenching Ely to the skin. Heroically he pulled back the controls with a prayer and the Curtiss freed itself and rose into the air, landing two and one-half miles away on the beach at Willoughby Spit. November 14, 1910 marked the birth of the carrier fighter and Ely as the first naval aviator, although only a civilian making a flight without pay!

The Navy, cautiously, ordered Lieut. Theodore G. Ellyson to duty at the Curtiss flying school to learn this new art. The severe weather at Hammondsport forced Ellyson and Curtiss to look for a more advantageous locale and on January 6, 1911 the Curtiss organization arrived at North Island in San Diego (Calif.) Bay with three airplanes. Today this magnificent island is the home of one of the largest and most powerful naval aviation bases in the entire world.

Captain Chambers was anxious to prove the ability of an airplane to land on a ship, thereby satisfying the skepticism of the Navy Department. Eugene Ely was again selected for the attempt and the *Pennsylvania*, moored in San Francisco Harbor, was rigged for the experiment. A platform, 120 feet long, was erected on the after turret, its forward end raised five feet to assist in bringing the airplane to a halt. It was agreed that lines to which were attached sandbags stretched across the deck would offer the best solution to halt the plane, by providing progressively greater drag on the airplane as it dragged across the deck.

The Curtiss Pusher was equipped with hooks on the landing gear with which to grasp the lines. January 18, 1911 dawned to see Ely in the air bound for the *Pennsylvania*, which was steaming towards the Golden Gate, the wind at its back! Ely nosed down towards the platform, passed

*(Continued on page 54)*



Eugene Ely makes first takeoff from deck of U.S.S. Birmingham Nov. 14, 1910

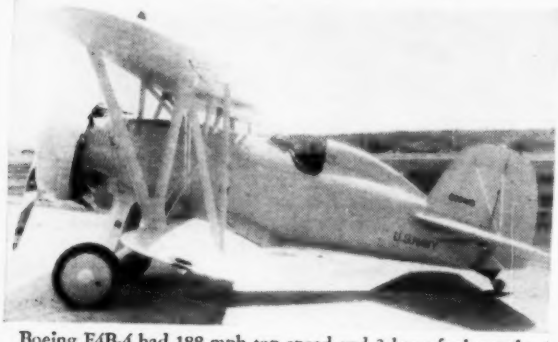
Vought VE-7 was 1922-24 fighter with two .30 cal. guns. Top speed was 116 mph

Curtiss TS was originally a seaplane and was Navy's first fighter design

Curtiss F6C-1 was first type on Lexington & Saratoga. Top speed was 155 mph

Boeing F2B-1 which started Navy air-cooled engine trend

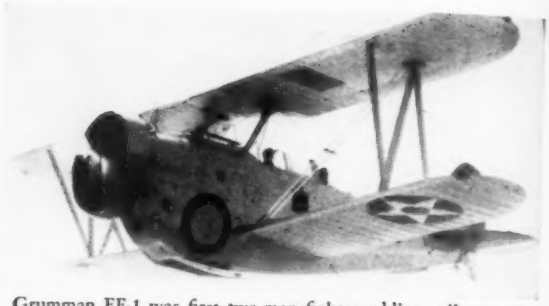
Boeing F3B-1 High Hats stunt-team tied together



Boeing F4B-4 had 188 mph top speed and 3 hour fuel supply

Curtiss BF2C-1 was first of dual-purpose bomber fighters

*Official U.S. Navy Photographs*



Grumman FF-1 was first two-man fighter adding tail gunner

Famous Grumman F3F-2 fighter standardized on carriers

Brewster F2A-1 was used in small numbers then sold to R.N.A.F.

History-making Grumman Wildcat standard Navy fighter last year

Vought Corsair latest carrier fighter inherits splendid background

# THE GLIDE

**An analysis of glide forces on a powerless craft**

*by* **FRANK ZAIC**

GLIDERS are not as simple as they seem. They can be more exasperating then a sulky motor when the arrangement of forces is not balanced but you cannot locate the trouble. We know from experience! Since there are no torque problems to consider there is greater leeway in glider design so that the chances of designing a fair flier are better than in the power class.

Although we could start by giving design proportions, building and flying hints, it is our belief that a certain amount of glider theory is essential to successful design.

Assume that the glider is being dropped from a free balloon without any forward motion. As soon as it is dropped the glider is in the clutches of gravity which tries to bring it down as fast as possible. However, as soon as the glider moves it hits the air molecules. Natural reactions take place. Certain portions of the glider, such as wing and tail, offer large areas to these reactions and there is a general readjustment about the C. G. of the glider. Because of the tail's long moment arm the air molecules are very successful in their reactions on the tail so that while they tend to prevent the tail from falling the front drops downward. See diagram below. Before we know it the glider is diving almost straight down. Because of the tail effect, this will happen no matter in what position the glider is released.

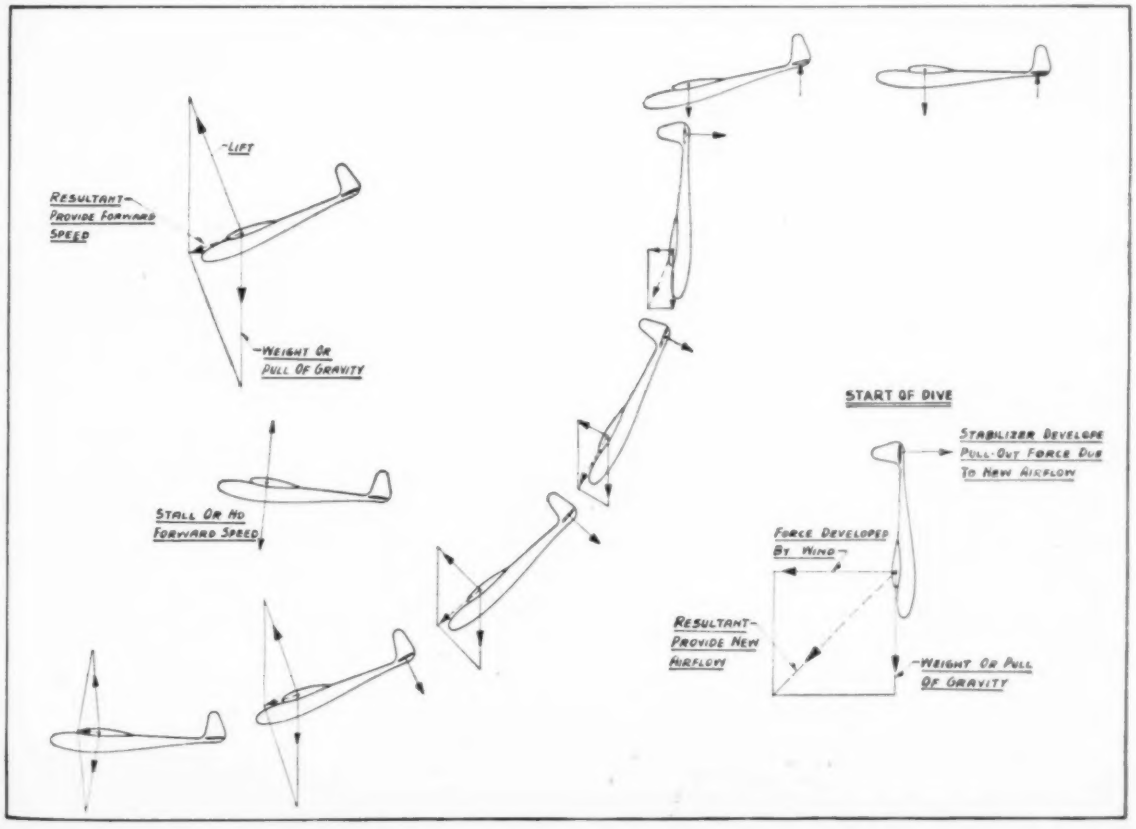
As the glider is steadied into the dive by the tail its air resistance is being constantly decreased and it will probably offer least resistance to the air when diving so that its diving speed builds up rapidly. (Full size soarers have been known to reach diving speeds of 200 m.p.h before the pilot realized it while soaring in turbulent cumulous clouds.) If we now examine the diagram we will note that the glider is under conditions similar to those found in horizontal flying. That is, the air is flowing over its surfaces and aerodynamic reactions are taking place.

While the glider is diving downward and building up speed, the air flow may be considered as being upward. This will react on wing and tail and it will tend to bring about their aerodynamic balance. Normally, this balance will occur before the glider reaches the vertical dive position and the glider will zoom out of the dive. But for explanatory purposes, it is best to assume that the glider reaches the vertical dive.

As the air flows around the wing, forces which would normally be called "lift" are developed. See diagram. Also note the force supplied by gravity. We now have two basic forces, one side up and another down. Evidently the glider can no longer go straight down but must move at an angle resolved by the two forces.

Although the glider may be moving in a new direction its nose is still pointed down. However, this is only for an instant. As soon as the glider moves in the new direction the airflow changes and is now along a new direction. By noting this new direction with respect

*(Continued on page 47)*



SUPER STREAMLINED
CLASS D-ROG-FUSELAGE
DESIGNED & DRAWN BY:
Christian Dean Berger
SECTION OF FUSELAGE ¼ SIZE
FUSELAGE CONSTRUCTION
STABILIZER ¼ SIZE
WING ¼ SIZE
R.A.F. 32
TAIL
PROP.
NOSE
TAIL PLUG
WINDING HOOK
LARGE FACE BUSHING
SCREW HOOK
CRINKLIN PATCHES
TENSIONER SPRING
CUTTING TAPER WING RIBS
PLANKING TAPERS
MARKS ON BULKHD
FULL SIZE WING RIBS
DIHEDRAL 4"
WEIGHTS
FUSELAGE 1.20 oz
WING .70
PROP ASS'Y. .70
TAIL ASS'Y. .35
RUBBER 2.10
TOTAL 5.25
WING AREA:
SURFACE 170.5 sq in
PROJECTED 166.4 sq in
REQ. WEIGHT 5.0 oz

# THE STREAMLINER!

**A super Class D fuselage model**

*by* **CHRISTIAN D. BERGER**

THE two most important characteristics of a contest model are its climb, and gliding ability. For, after all, you have to get up high to catch thermals, but what good is a thermal to a model which sinks through one like a hot knife through butter? Of course, there is always stability, but as far as stability is concerned one need say only this—no model can long endure without it.

It was with these thoughts in mind that this streamlined ship was designed. As you can see, every conceivable thing has been done to "clean up" the model and reduce drag. Round monocoque fuselage, one wheel landing gear, folding propeller, taper wing, streamlined wing mount, lifting tail and twin rudders all help to give a high lift to drag ratio. A fault common to most streamline models, excess weight, has been carefully avoided and no frivolous, impractical streamlining, such as using wheel pants or propeller spinner, has been done.

After the original ship was built, it performed even better than expected. Although it was never entered in any large contests such as the Nationals, it has won many local contests, one of which was the Cabin event of a New York University Model Airplane Championships.

Unlike most streamline ships, this model is a remarkably consistent performer and will fly in almost any kind of weather. To give it an extremely high, powerful climb, a long heavy motor strung all the way to the tail of the model is used. The motor (16 strands of 1/4" x 1/30" brown rubber, 30" long) weighs 2.1 oz. and constitutes 40% of the model's weight. It is an established fact that, other things being equal, the greater the percentage of weight contained in the rubber the greater will be the model's climb. Though 40% is an extremely high weight ratio, compared to other fuselage models, this combined with its low drag qualities, accounts for its spectacular climb.

In case you find it difficult to build the ship as light as specified, you're still safe because at 6 oz. you will have 35% rubber (which is still quite high), and even at 7 oz. the ship will have 30% rubber, just normal for fuselage models. However, it is quite easy to build the ship light as long as you use light quarter-grained balsa; such wood is stronger than other cuts of heavier balsa.

Now that we are on the subject of wood, let's start the—

CONSTRUCTION: Although this is not considered a beginner's model, plans and instructions are so explicit that even the tyro should have little difficulty in building this ship.

Study the plans carefully before you start to build anything. The entire model (except spars and blocks) is constructed of quarter-grained balsa.

FUSELAGE: Using the full size templates, cut the bulkheads from 1/16" sheet balsa. For bulkheads over 3" wide cement an extra strip of wood to 3" sheet. Mark each bulkhead, in ink, with markings that appear on the corresponding template. Don't worry about using wood that is too light, for even if the bulkheads break out after completion, it won't noticeably weaken the fuselage.

Planks are 1/16" x 3/8" wide. Here again use very light wood. Mark two master planks directly from the plans. Cement the bulkheads (starting with No. 7, 8 and 9) to these master planks where marks for the corresponding bulkheads appear, and set each bulkhead in so that the planks cover the spaces made by marks on the bulkheads. Carelessness here will result in a bumpy fuselage. Pin the ends of the master planks together temporarily and check the alignment continually as work progresses. After all bulkheads are attached to the master planks cement two more planks about midway between the master planks. Then start to add more planks by cementing them to the edges (and to the bulkheads too, of course) of these first four planks.

Each of these additional planks must be beveled along one edge, otherwise cracks will show between the planks. Before cementing a plank in place, run a sandpaper block, at an angle, along that edge which you are about to cement to the preceding plank, so as to bevel it. Work slowly and cement only part of a plank at a time. Use plenty of cement but wipe off any excess.

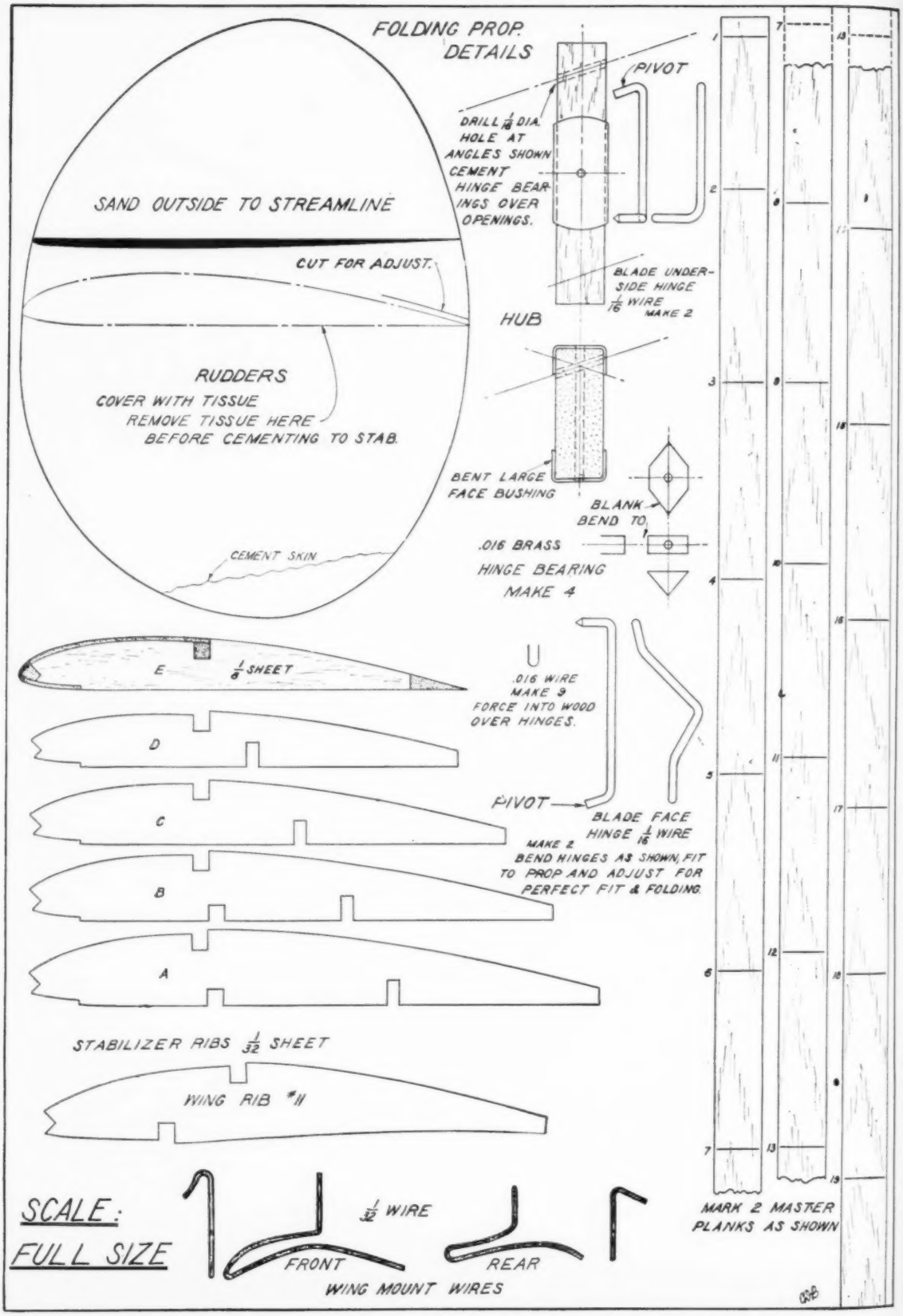
When about ten planks have been added cement the landing gear and wing mount fittings in place, where the marks appear on the bulkheads. Use three coats of cement and then cover the glue joints with a patch of silk, using more cement. Put these fittings in "to stay."

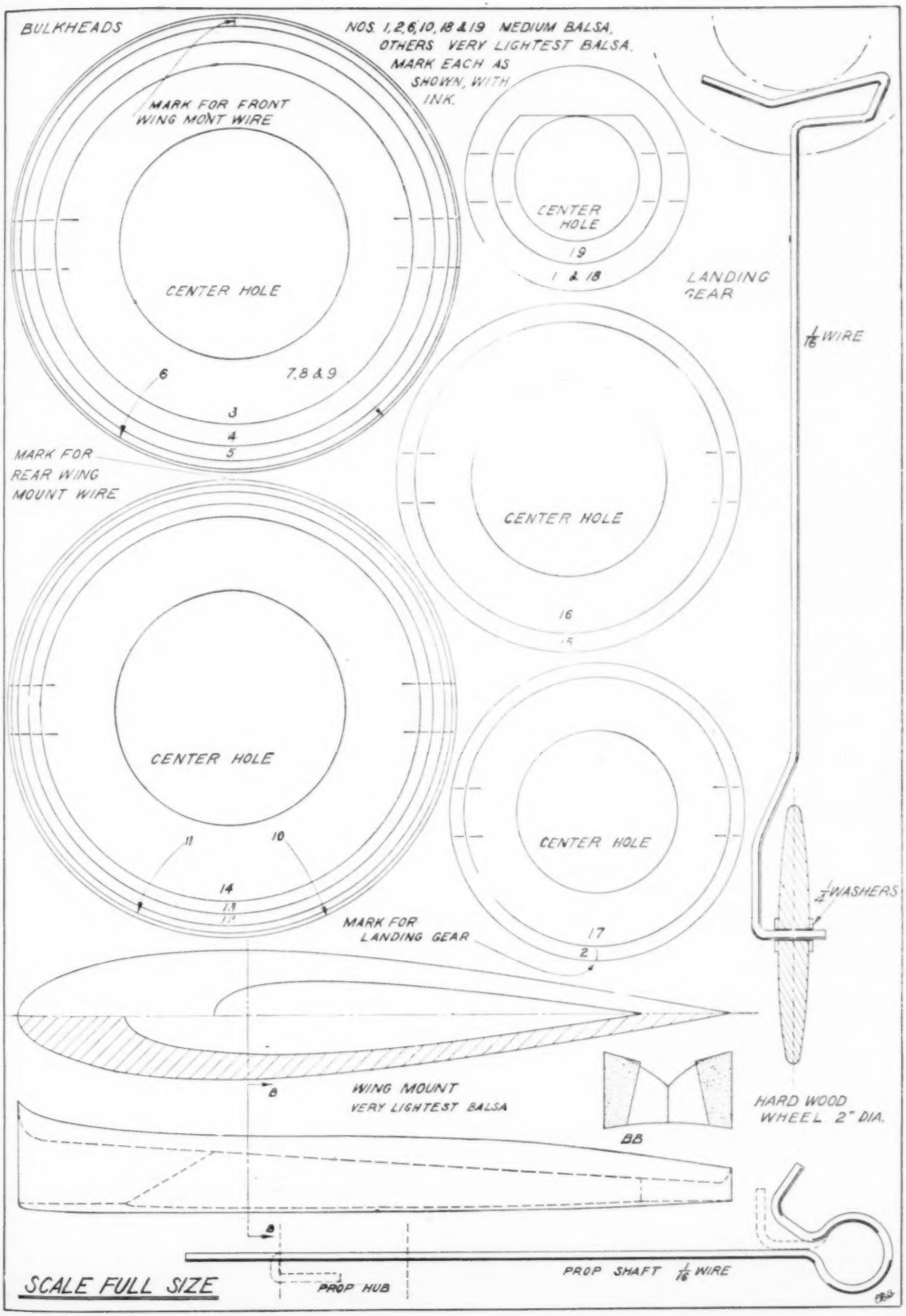
Now continue the planking. When angles form near the nose and tail cut a straight taper on the plank and jam it in to fit. After planking is finished, let it dry thoroughly and then sand lightly all over with fine sandpaper. Take off as much balsa as possible but don't rub in any "windows." Apply two or three coats of dope, sanding in between, or cover with tissue for super strength. Now trim the plank ends, build in tail plug and nose plug holes, cut out the space for the stabilizer and cover this with a piece of 1/16" sheet. Addition of the wing mount block and wheel complete the fuselage.

WING: Cut ribs No. 1, 10 and 11 from 1/32" balsa, using the templates. Now stack up 9 pieces of 1/32" sheet balsa between ribs No. 1 and No. 10, like a set of books between bookends, and pin them together. Carve and sand this "block" so it tapers from rib No. 1 to rib No. 10 thus giving a perfect set of ribs for a taper wing. This method is very fast and accurate. Make two sets of such ribs.

Draw full size wing plans and rub some wax (a candle will do) over the lines so that the construction won't get stuck.

*(Continued on page 49)*


FOLDING PROP. DETAILS
PIVOT
DRILL 1/16 DIA. HOLE AT ANGLES SHOWN CEMENT HINGE BEARINGS OVER OPENINGS.
SAND OUTSIDE TO STREAMLINE
CUT FOR ADJUST.
BLADE UNDERSIDE HINGE 1/16 WIRE MAKE 2
HUB
RUDDERS
COVER WITH TISSUE
REMOVE TISSUE HERE BEFORE CEMENTING TO STAB.
BENT LARGE FACE BUSHING
BLANK BEND TO
.016 BRASS
HINGE BEARING MAKE 4
CEMENT SKIN
E 1/8 SHEET
U
.016 WIRE MAKE 9 FORCE INTO WOOD OVER HINGES.
D
C
B
A
PIVOT
BLADE FACE HINGE 1/16 WIRE MAKE 2 BEND HINGES AS SHOWN, FIT TO PROP AND ADJUST FOR PERFECT FIT & FOLDING.
STABILIZER RIBS 1/32 SHEET
WING RIB #11
SCALE: FULL SIZE
1/32 WIRE
FRONT
REAR
WING MOUNT WIRES
MARK 2 MASTER PLANKS AS SHOWN


BULKHEADS
NOS. 1,2,6,10,18 & 19 MEDIUM BALSA.
OTHERS VERY LIGHTEST BALSA.
MARK EACH AS SHOWN, WITH INK.
MARK FOR FRONT WING MONT WIRE
CENTER HOLE
6
7,8 & 9
3
4
5
MARK FOR REAR WING MOUNT WIRE
CENTER HOLE
19
1 & 18
LANDING GEAR
1/16 WIRE
CENTER HOLE
16
15
CENTER HOLE
11
10
14
13
12
CENTER HOLE
17
2
MARK FOR LANDING GEAR
1/2 WASHERS
B
WING MOUNT
VERY LIGHTEST BALSA
BB
HARD WOOD WHEEL 2" DIA.
A
PROP SHAFT 1/16 WIRE
PROP HUB
SCALE FULL SIZE

# MODELING YOUR FUTURE IN AVIATION

**Basic Tests for Stability**

**Article No. 17**

**Official Air Youth Course in elementary aeronautics**

*by* **CHARLES H. GRANT**

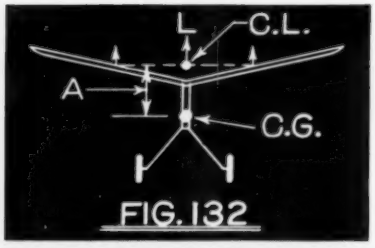


FIG. 132

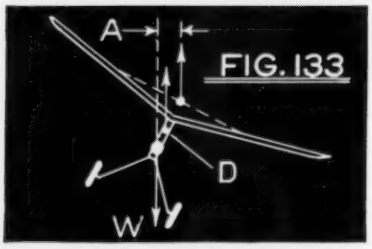


FIG. 133

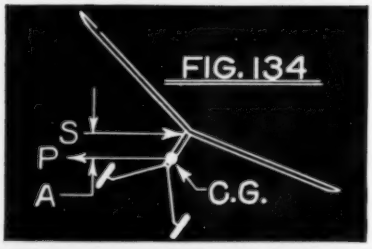


FIG. 134

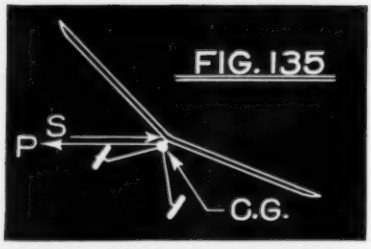
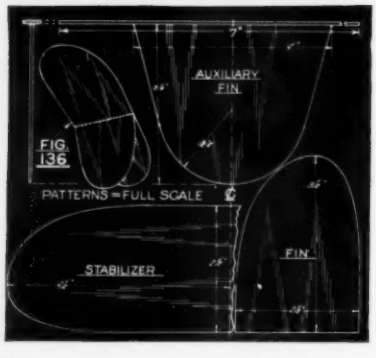


FIG. 135




STABILITY, in simple terms is the problem of increasing corrective forces and reducing disturbing forces acting upon an airplane in flight. This is accomplished by making the various control units of certain form and size and placing them in definite position relative to one another.

Preceding experiments of this series have been concerned chiefly with form, size and arrangements that *increase* corrective forces to a degree sufficient to overcome the disturbing forces. The latter have been comparatively slight due to the slow flight speed and light weight of the model. Consequently it has been possible to attain sufficient corrective effects without giving them consideration.

Many corrective effects are based upon the action of gravity on the plane and are directly proportional in magnitude to the weight. The action of a "low center of weight" is an example. Raising the wing, raises the center of lift and thereby increases the distance between it and the plane's center of weight or C.G., A Fig. 132. This increases the pendulum effect of the C.G. about the center of lift, C.L., acting as the suspension point, causing increased righting moments when the plane is rolled sideways into a banked position, Fig. 133. The righting moment is C.G. times distance A. It can readily be seen that the righting moment is less when C.L. is closer to C.G., at D, for instance.

However, most disturbing effects are based upon the velocity of the airplane as well as its mass and are directly proportional to the velocity *squared* times the weight or mass. Consequently, with an increase in speed the possibility of disturbing moments becomes extremely large compared to any increase in corrective moments.

This important design consideration is dramatically illustrated with a large percentage of crackups when modelers, experienced in flying slow rubber powered models, attempt to design and fly heavy, fast gas jobs. Due to faulty design, disturbing moments under the effect of increased speed become so large that corrective forces prove ineffectual. Before consistently successful gas model flights are possible it is necessary to develop methods of reducing these disturbing moments.

The chief offender is centrifugal force developed in fast turns, and the correspondingly large side air pressure produced in the opposite direction. When the latter acts at a point far above the former, large rolling moments are generated, distance A times force S, Fig. 134. Though these forces are large at high speed their effect is reduced to allowable limits when they act at the same point or at points fairly close together as indicated by S and P, Fig. 135. Because these forces change with speed and weight rather than with some form, size or other visible plane characteristic, their importance is overlooked and ignored by many modelers. They cannot be reduced but their effect can be controlled by careful design.

An analysis and explanation of the problem is extremely complicated and difficult to understand due to many mathematical factors involved but the effects and how to control them through design can be demonstrated by a few simple experiments. These consist of flying a test model at high speed, noting the effects of changes in position of lateral or vertical areas relative to the airplane's center of gravity, C.G.

First we will test the effect of a "high wing" in combination with a high fin, second the effect of lowering the lateral area by means of a fin beneath the wing and pylon and third the effect of placing the fin low beneath the motor stick in combination with a wing in normal position and in a high parasol position. The following equipment is required for the test:

1. The basic test frame and propeller.
2. A six strand motor in place of the four strand.
3. The normal wing similar to the basic test model wing.
4. The wing pylon.
5. Detachable fin and stabilizer of the same size as the basic model.
6. A small fin similar to the one used in tests in Article No. 13, July issue, Figure 108, Page 28.
7. Normal size stabilizer and fin cemented together as a unit and to be assembled to the frame stick with fin downward.

Complete plans for the test frame, propeller and normal wing are given in detail in Article No. 11 on Pages 12 and 13 of the May issue. Plans for the pylon are given in the September issue on page 28. Plans for the normal detachable fin and stabilizer and the small fin are given in Article 13, Page 28 of the May issue. It will be required to construct the new stabilizer and fin unit. These are to be made of 3/64" sheet balsa cut to the outline given on the plans.

When cut out sand the edges and both

sides of each part gently, then assemble the fin to the stabilizer with waterproof cement, as indicated in Fig. 136. Set this aside making sure that the fin remains perpendicular to the stabilizer while the cement is drying.

Follow the usual routine in preparing for your test flights. Note the wind direction making sure that there is plenty of cleared space down-wind from the starting point. Now assemble your model for the first test flight attaching the pylon in position indicated in Fig. 137. The wing is attached to the top of the pylon as indicated and the detachable stabilizer and fin are fastened in place in the rear of the motor stick. Between the motor stick and the rear edge of the stabilizer insert a small shim of balsa, 1/16" thick. This gives the stabilizer the correct positive angle required when parasol wings are used.

When the plane is in alignment with wings and tail surfaces straight, glide the ship gently for balance. If it stalls move the wing back slightly. If the glide is too steep move it forward; 1/8 to 1/4 of an inch will be sufficient in either case.

You are now ready for your first power flight using only about fifty turns in the motor. Launch the plane in the customary horizontal position. With only the few winds the plane will have little speed and you will be able to determine any flight correction required: this preliminary flight is to determine balance only.

Adjust the model as required, move the wing backward or forward to reduce stalling or diving. When the model flies perfectly at slow speed, test it under full power. With the six-strand motor the plane will be considerably faster than with the old one of four strands. The purpose of the test is to determine the difference in the model's flight reaction at high speed compared to low speed. If the model makes practically a straight flight, the only apparent difference will probably be altitude attained. With greater power the plane will climb more steeply and higher, probably it will not fly as far under power because the six strand motor will take fewer turns than the four. The glide will be longer, however, and the length of the total flight may be slightly more than with four strands.

The effect of speed on this type of plane is not evident in straight flights but trouble usually results when it turns to the left under effect of propeller torque. This turning type of flight is customary. Watch the model closely on the turns and observe any difference between flights at low and high speed.

You can expect this plane, with six strands, to bank steeply, probably 45° or more with the resulting gradual drop of the nose and an eventual spiral dive into the ground unless the wing is placed well forward to produce stalling around the turn. This often is sufficient to hold up the nose and prevent diving.

However, it will be clearly indicated that under high speed the plane will have a tendency to bank and dive excessively. This condition is caused by centrifugal force acting outward in the center of gravity, in conjunction with side air pres-

*(Continued on page 43)*

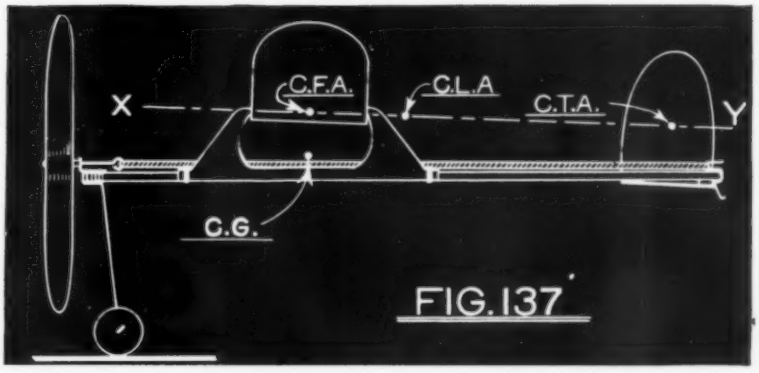


FIG. 137

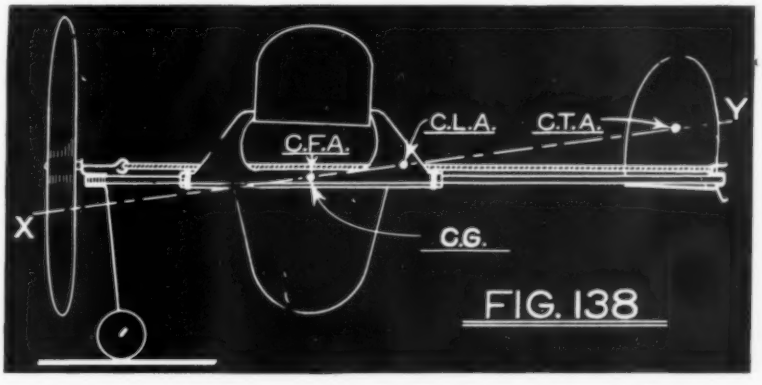


FIG. 138

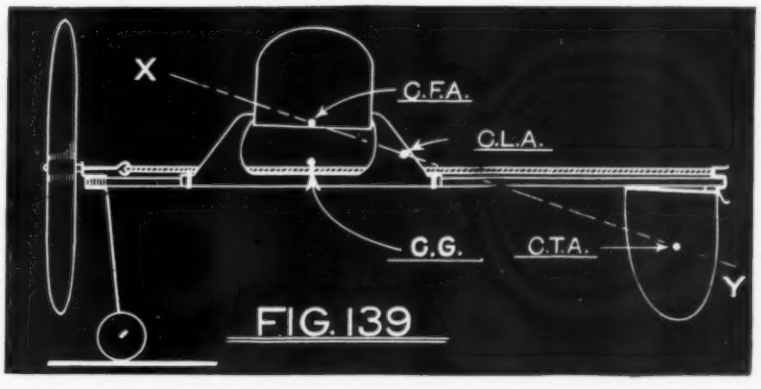


FIG. 139

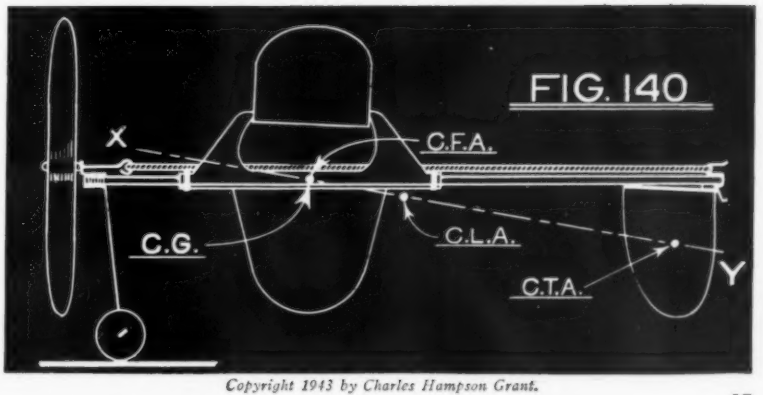
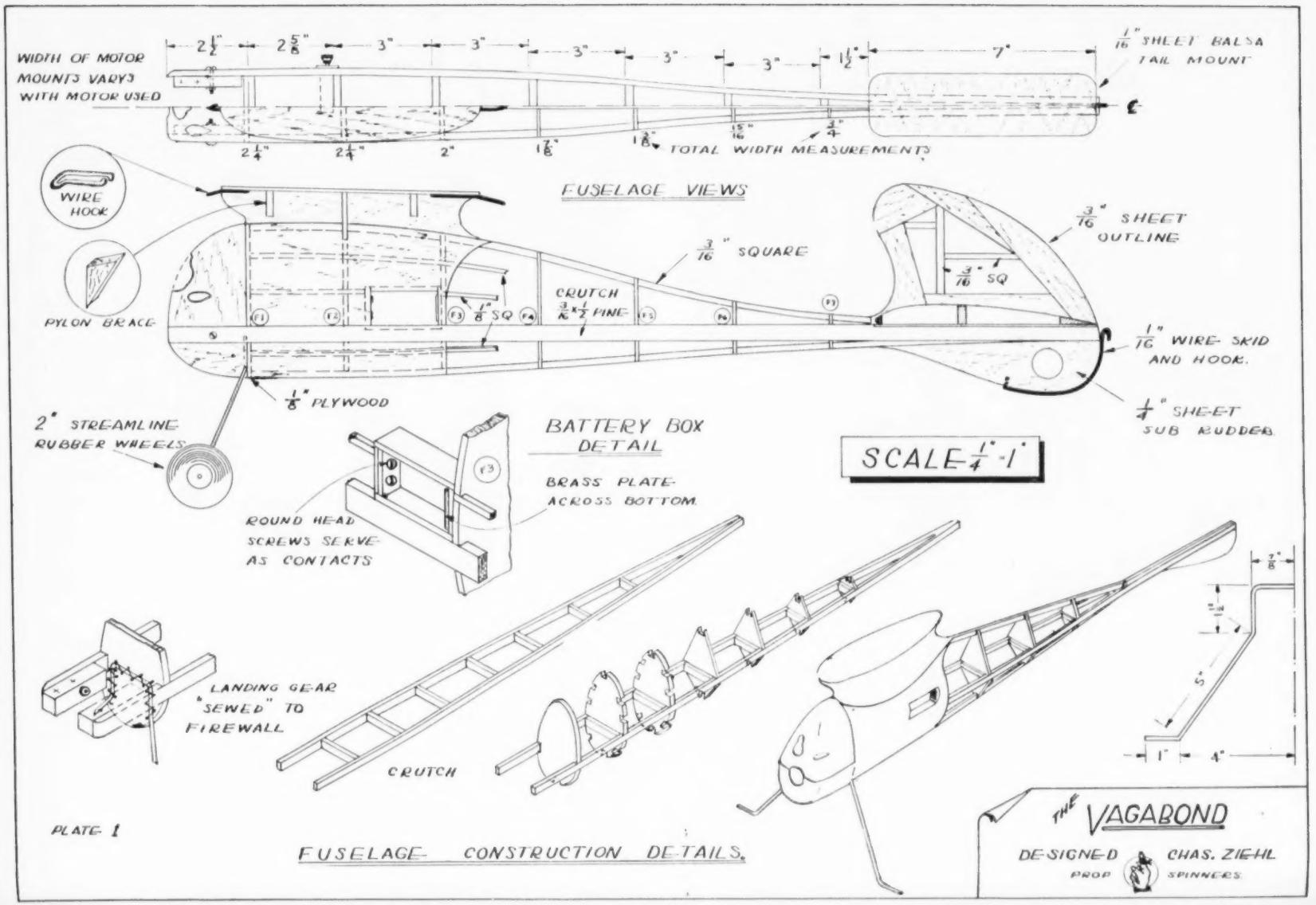


FIG. 140

*Copyright 1943 by Charles Hampson Grant.*


WIDTH OF MOTOR MOUNTS VARYS WITH MOTOR USED
2½" 2⅝" 3" 3" 3" 3" 3" 1½" 7"
1/16" SHEET BALSA TAIL MOUNT
2¼" 2¼" 2" 1⅞" 1⅛" 15/16" ¾"
TOTAL WIDTH MEASUREMENTS
FUSELAGE VIEWS
WIRE HOOK
PYLON BRACE
3/16" SQUARE
3/16" SHEET OUTLINE
3/16" SQ
CRUTCH 3/8 x 1/2 PINE
1/8" SQ
1/16" WIRE SKID AND HOOK.
1/8" PLYWOOD
1/4" SHEET SUB RUDDER
2" STREAMLINE RUBBER WHEELS
BATTERY BOX DETAIL
BRASS PLATE ACROSS BOTTOM
ROUND HEAD SCREWS SERVE AS CONTACTS
SCALE 1/4" - 1"
LANDING GEAR "SEWED" TO FIREWALL
CRUTCH
PLATE 1
FUSELAGE CONSTRUCTION DETAILS.
THE VAGABOND
DESIGNED PROP CHAS. ZIEHL SPINNERS

*by*
**CHARLES ZIEHL**

# THE VAGABOND

HERE at long last is a model that has been so simplified that there is no beginner who need be afraid to undertake its construction and yet every experienced modeler will find it well worth his while to build.

About a year ago the author decided to design a gas model which would come within the capacities of a new modeleer. The first requisite would have to be simplicity. Taking this into consideration work began on a highly simplified plane. In so designing, all thoughts of super performance were cast aside in favor of simple, down-to-earth construction.

Upon completion of this job a few test flights were required for adjustments and then the plane was given a real trial. Seeing its possibilities, it was entered in a local club contest at Creedmore, Long Island. Its potentialities were realized when it took first place in this contest.

Thinking that even this could be bettered the author then attempted to combine the same construction with a better performance. Drag was considerably lowered by streamlining and a new airfoil was used in the wing. This proved to be better than expectations. At Creedmore the following month, after an hour of adjustments and low-powered flights, she was opened up wide. On a 20-second motor run the plane vanished after 4:09, but luckily was later returned.

Now, after almost a year of constant designing, building, testing and re-designing this is the final product and by all means it not only combines simplicity of design and top-notch performance, but also that all important "eye-appeal."

But, far from being just a contest model, this rugged little ship often provided a day of sport for the mere price of a pair of pen cells by combining a short motor run and a folding prop.

Knowing the model builders' "love" for enlarging plans this has been eliminated as much as possible. The only odd shaped unit is the rudder and fellows it's given full size in the diagrams, so why worry?

Arm yourself with a few sheets of paper, a pencil, a compass, ruler and the required building materials, hibernate to a secluded spot and in a few short days you can blossom forth with a model which will guarantee you success.

FUSELAGE: Construction begins with the fuselage which has been simplified to the *nth* degree. The only plan required for its construction is the plan of the crutch. This can easily be made by following the dimensions given on the top view in the construction plan of plate one. The 3/16" by 1/2" pine crutch is constructed directly on this plan. While the crutch is drying the formers, which are given full size on Plate 2, may be traced and cut out. Note that formers 2 and 3 are 1/8" sheet while 4 to 7 are 1/16" sheet. Former 1 is of plywood and is the only former glued in front of the cross brace of the crutch. When the glue is thoroughly dry on the crutch remove it from the plan and put the formers in place. After all the formers have been glued in position on the crutch the square top and bottom longerons are secured in their respective notches.

The author with The Vagabond

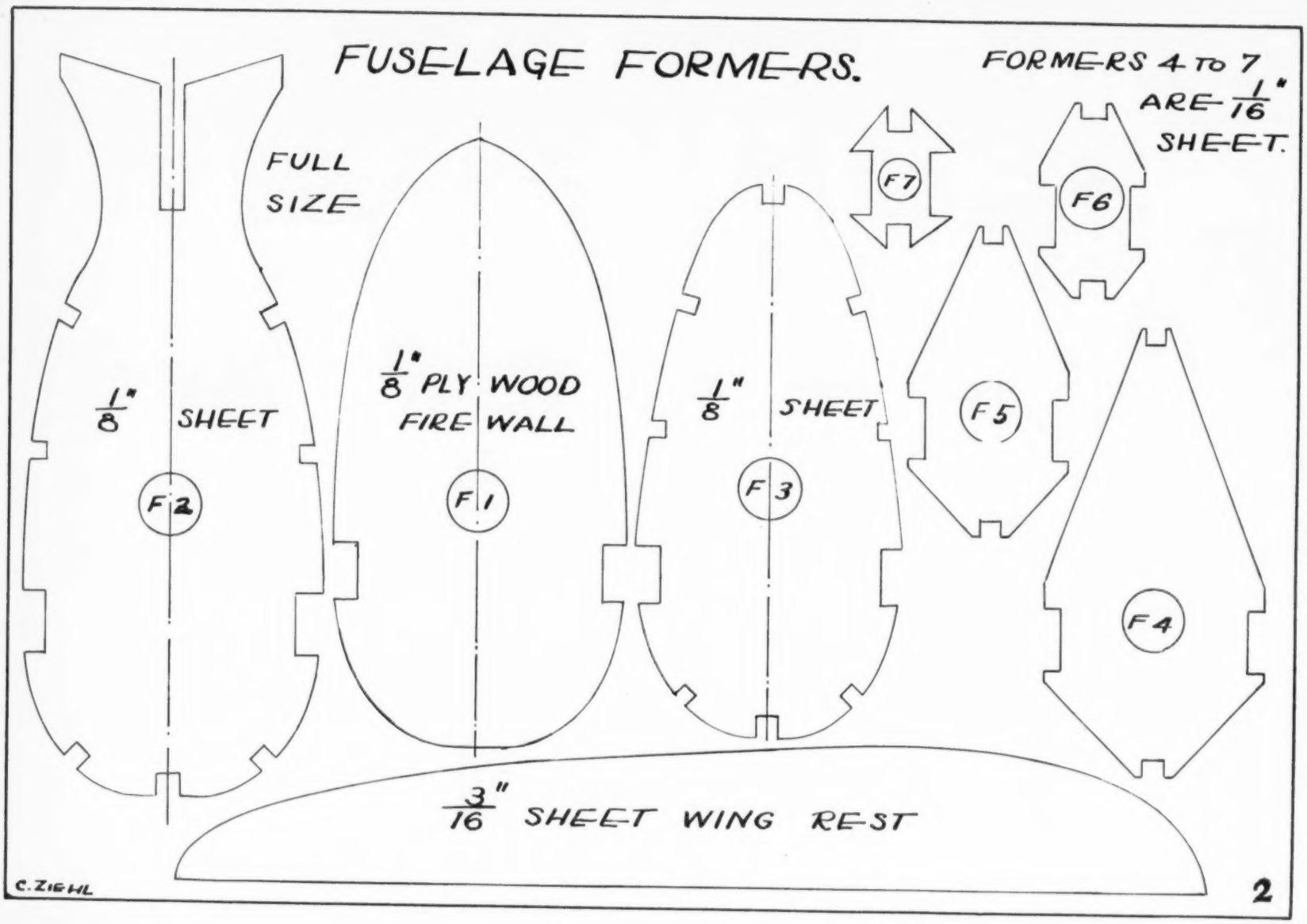
When this operation is completed the landing gear and battery box are built into position. The landing gear is bent of 1/16" diameter spring steel according to the plan. Small holes are drilled in the firewall equi distant apart in alternating order on opposite sides of the position of the landing gear. The landing gear is put in place and "sewed" in a criss-cross fashion with ordinary strong black cotton thread. Several coats of glue on the thead tend to strengthen the mooring of the gear and complete its installation.

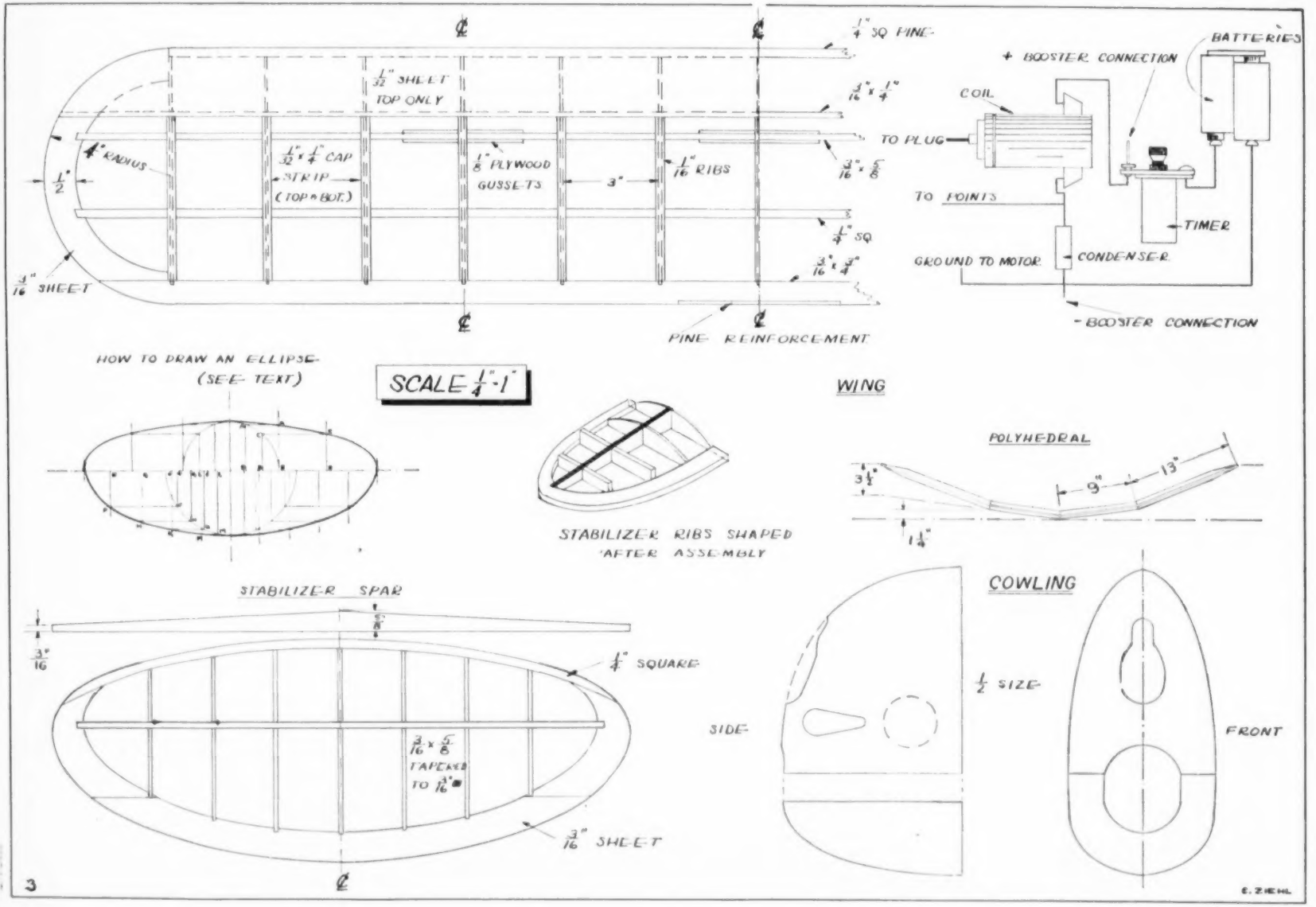
The battery box is constructed of 1/8" pine. A thin brass plate is glued across the back end and two small round head machine screws are inserted in the opposite end of the box, heads inwards to act as contacts. The box is glued in position against former F3 and the crutch according to the plan.

The 1/8" square stringers are now glued into the notches of F2 and F3 and against the sides of the remaining formers. Care should be taken to glue these stringers alternately on both sides of the fuselage to prevent distortion due to twisting.

The pylon which is given full size on Plate 4 is of 3/16" sheet balsa and is inserted into the slot in F2 and glued

*(Continued on page 62)*


FUSELAGE FORMERS.
FORMERS 4 TO 7 ARE 1/16" SHEET.
FULL SIZE
1/8" SHEET
F2
1/8" PLY WOOD FIRE WALL
F1
1/8" SHEET
F3
F7
F6
F5
F4
3/16" SHEET WING REST
C. ZIEHL
2

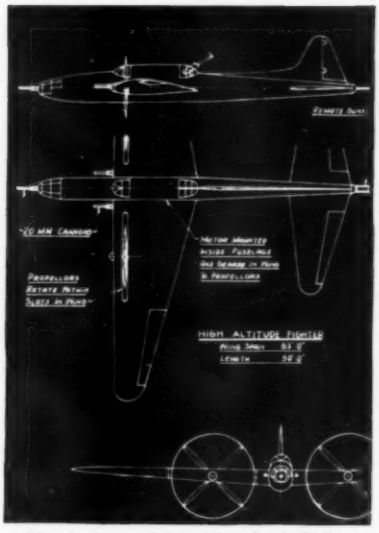

1/32" SHEET TOP ONLY
1/4" SQ PINE
1/16" x 1/4"
4" RADIUS
1/2"
1/32" x 1/4" CAP STRIP (TOP & BOT.)
1/8" PLYWOOD GUSSETS
3"
1/16" RIBS
3/16" x 5/8"
1/4" SQ
3/16" x 3/4"
3/16" SHEET
PINE REINFORCEMENT
BATTERIES
+ BOOSTER CONNECTION
COIL
TO PLUG
TO POINTS
TIMER
GROUND TO MOTOR
CONDENSER
- BOOSTER CONNECTION
HOW TO DRAW AN ELLIPSE (SEE TEXT)
SCALE 1/4" - 1"
STABILIZER RIBS SHAPED AFTER ASSEMBLY
WING
POLYHEDRAL
3 1/2"
9"
13"
1 1/4"
STABILIZER SPAR
3/16"
5/8"
1/4" SQUARE
3/16 x 5/8 TAPERED TO 3/16"
3/16" SHEET
COWLING
1/2 SIZE
SIDE
FRONT
3
E. ZIEHL

4
SUB - RUDDER
4" SHEET.
FULL SIZE
MAKE 13 RIBS
OF 1/16" SHEET.
PYLON
3/16" SHEET
C.ZIEHL

# DESIGN FORUM

***Analysis and discussion of ideas submitted by readers***

IN THE Design Forum we present each month a selection of reader-designed airplanes for criticism from an engineering standpoint. These analyses are intended not so much as a service to the individual designer but as lessons in design to all readers in the hope that brief, technical lessons can be learned rapidly and pointedly by those who have not, as yet, had access to a thorough engineering education. It has been surprising, however, how the same broad, general mistakes in fundamental concepts are made by contributors to this column. It may be, therefore, advantageous to present, each month, a brief lesson in airplane design. It would be absurd to attempt to teach airplane design in these columns for that is the work of our universities and our aircraft companies. However, for the next few months, we shall present a series of lessons on the fundamentals of aircraft design which, taken together, will constitute a brief design procedure for those who care to submit their ideas.




No. 1, A novel "prop-in-wing" design

## No. 1 Type

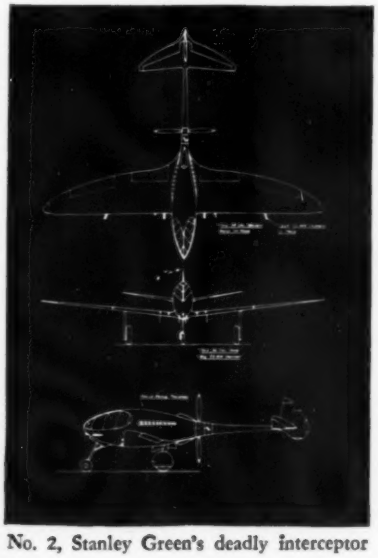
It is vital, when the designer sits down to his board to begin preliminary work on an airplane design, that he have a very clear-cut idea of exactly what he's going to do. Actually, the three-view drawing is the last step in the design of an airplane and not the first as so many of our readers are inclined to believe. Aircraft design is not simply drawing a series of pictures, choosing the best looking, then setting about the process of building the ship.

Once this picture has been drawn the painful task of putting into its interior all of the myriad items of equipment begins. Most frequently this results in changes in the exterior lines of the plane. For example when we have to install an engine that is 56" in width into a plane whose maximum width in the location selected for this engine is only 42", it is obvious that the lines of the plane must be changed to allow for this engine width. Therefore, it is most logical that the engine should be selected first, its diameter noted, and the outline of the airplane drawn around it. This holds true for the power plant system, the landing gear, the fuel tanks, the armament, the pilot and crew, the instruments and a thousand-and-one other items. Therefore, early in the design procedure all of the equipment required must be mentally assembled, measured and weighed and its location selected. These items are sketched onto a sheet of paper in their approximate locations and the airplane is drawn to enclose them all. The equipment carried by an airplane varies widely in the different types of ships and therefore, the very first requirement of our design procedure is to decide exactly what type of airplane we're going to design. This sounds quite simple: we want an interceptor, or we want a bomber or we want a flying boat! But is this specific enough? What type of interceptor do we want? Just how far do we want our bomber to fly? How many people is our flying boat to carry? Truly, this first step is the most important, for it is here that we start drawing the line, commence enclosing our design thoughts into an ever decreasing circle, until we finally wind up on the inside of a very tight little set of specifications so exact that the airplane practically designs itself. There is most assuredly no mystery to airplane design, particularly the preliminary work in which we are interested in here. So, with the importance of the type firmly fixed in our mind, let's analyze the different types of airplane. To be sure they are multitudinous but in the military field the types may be broken down roughly as follows:

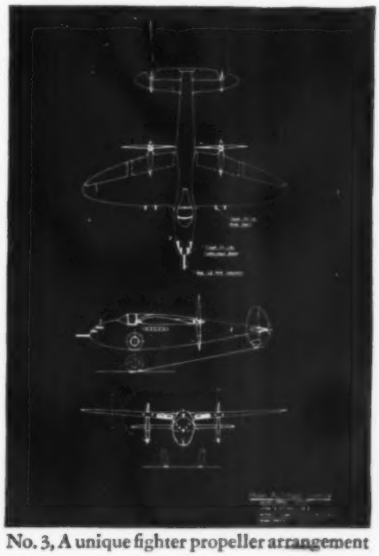
- Fighters
  - Interceptors
  - Pursuit
  - Convoy
  - Ground Attack
  - Bombers
- Bombers
  - Light
  - Medium
  - Heavy
  - Very Long Range
- Transports
- Trainers, etc.

These are very broad and general classifications and each of them may be broken down a great deal further. For instance, under interceptor-fighters alone we can have such types as long range, short range, multi-place, multi-engine, high altitude, low altitude, et cetera. Each of the planes mentioned above may be further broken down into details of their altitude, purpose, crew accommodations, number of engines, et cetera. Before commencing design, choose one of these types and do not progress until you have decided exactly at what altitude you want your airplane to perform, its tactical mission in detail, the number of the crew members as determined by the number of jobs there will be to do, the approximate distance it must be able to fly and return and the exact conditions under which it must operate. With the selection of these qualities you have

*(Continued on page 40)*



No. 2, Stanley Green's deadly interceptor



No. 3, A unique fighter propeller arrangement

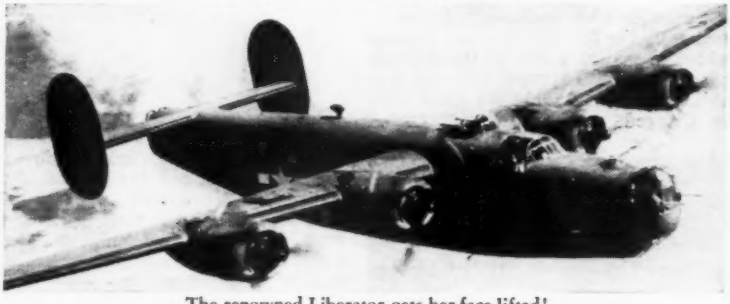
# FRONTIERS

**Picture news from the air-war battlegrounds**

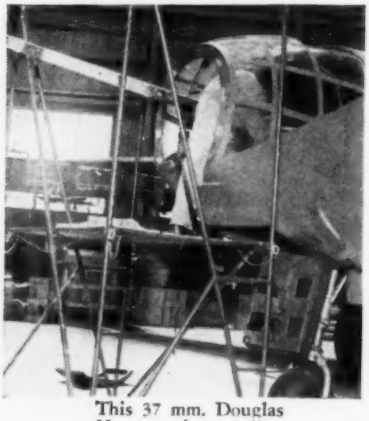
The famed Grumman (TBF) Avenger goes into action over Munda Airfield

The Lockheed F-5A camera plane takes on cameras

Douglas Skymaster C-54 has become the freight car of sky transport routes



The renowned Liberator gets her face lifted! New nose and tail turrets add fire power



This 37 mm. Douglas Havoc packs a wallop

The Mosquito bomber dons Uncle Sam's new insignia as she joins the Army Air Forces

When is a glider not a glider? When it is this Waco CG-4A powered by small, removable engines

Latest version of the Kaiser-Hughes monster compared to fighter and transport. Span 320' Wt. 200 tons Fuel 8000 gals.

Martin B-26 Marauder becomes flying arsenal with addition of fixed guns on fuselage sides and movable waist guns aft

Martin Baltimore ready for trans-Atlantic hop! Open bomb bay doors house huge tanks which are neatly faired into fuselage

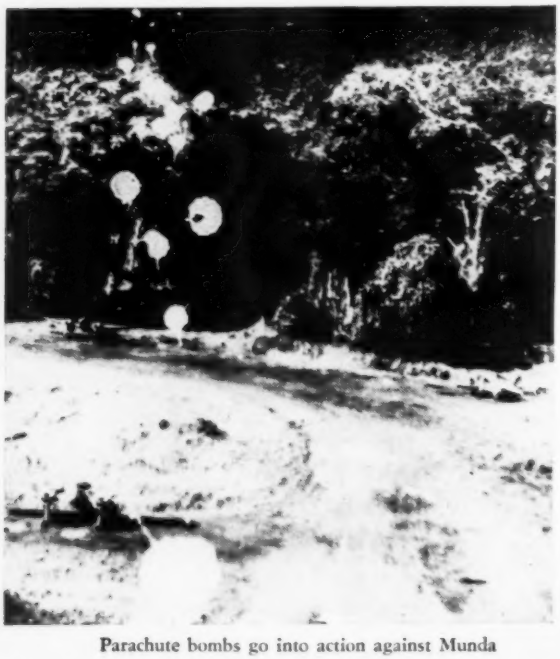
The Bowlus experimental CG-7 carried 8 men fully equipped but failed in competition with rugged Waco design

North American XB-28 bomber features pressure cabin for sub-stratosphere attacks but has not been ordered by A.A.F.

Wreckage of three Mitsubishi Zero fighters and one Aichi T-99 dive-bomber attest to the accuracy of Yank bombs on Munda

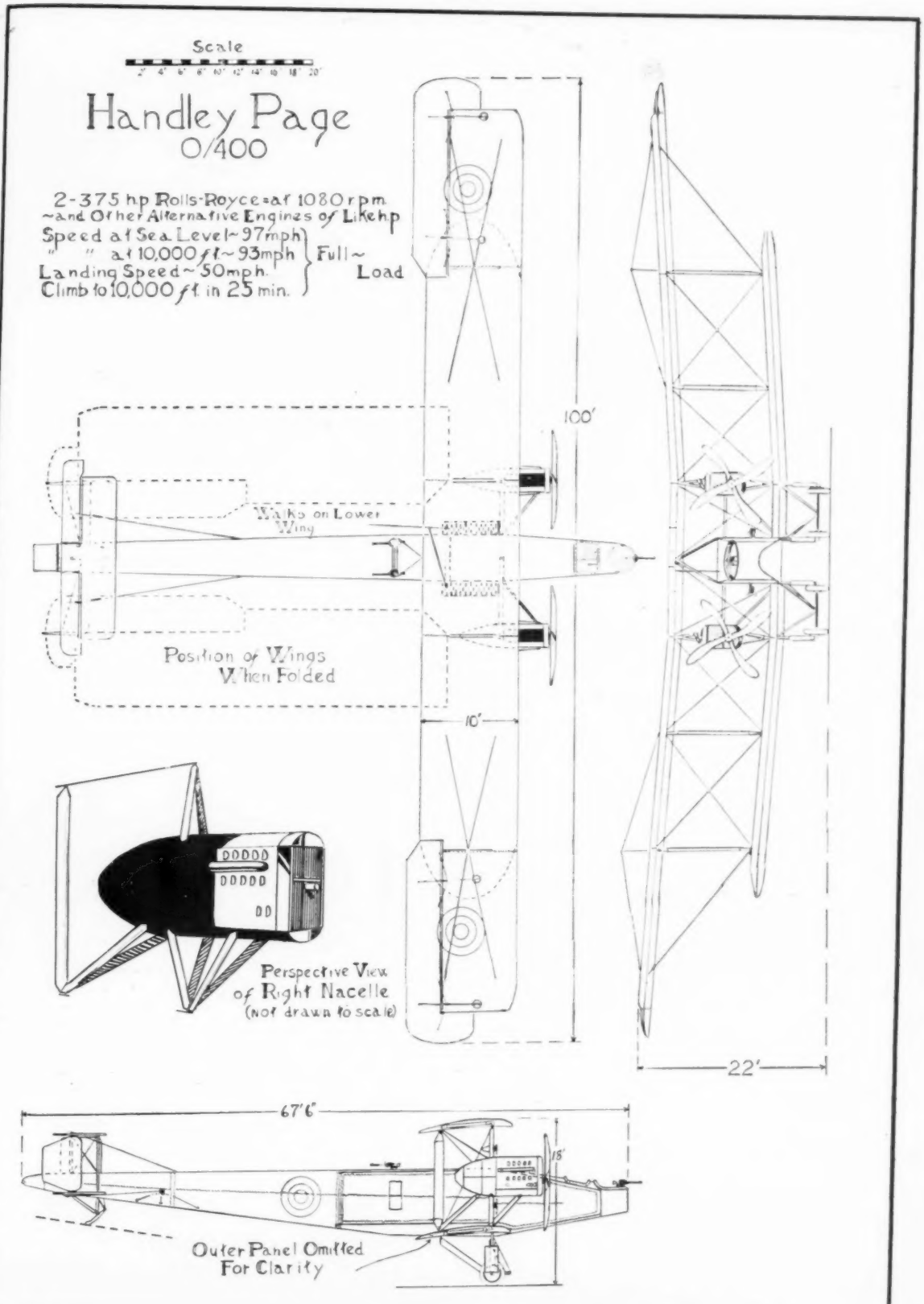
A Mitsubishi Type O1 bomber riddled on Munda Airfield

Douglas (SBD) Dauntless, bomb laden, leaves Guadalcanal for Munda. These dive-bombers smeared Jap resistance on the airfield



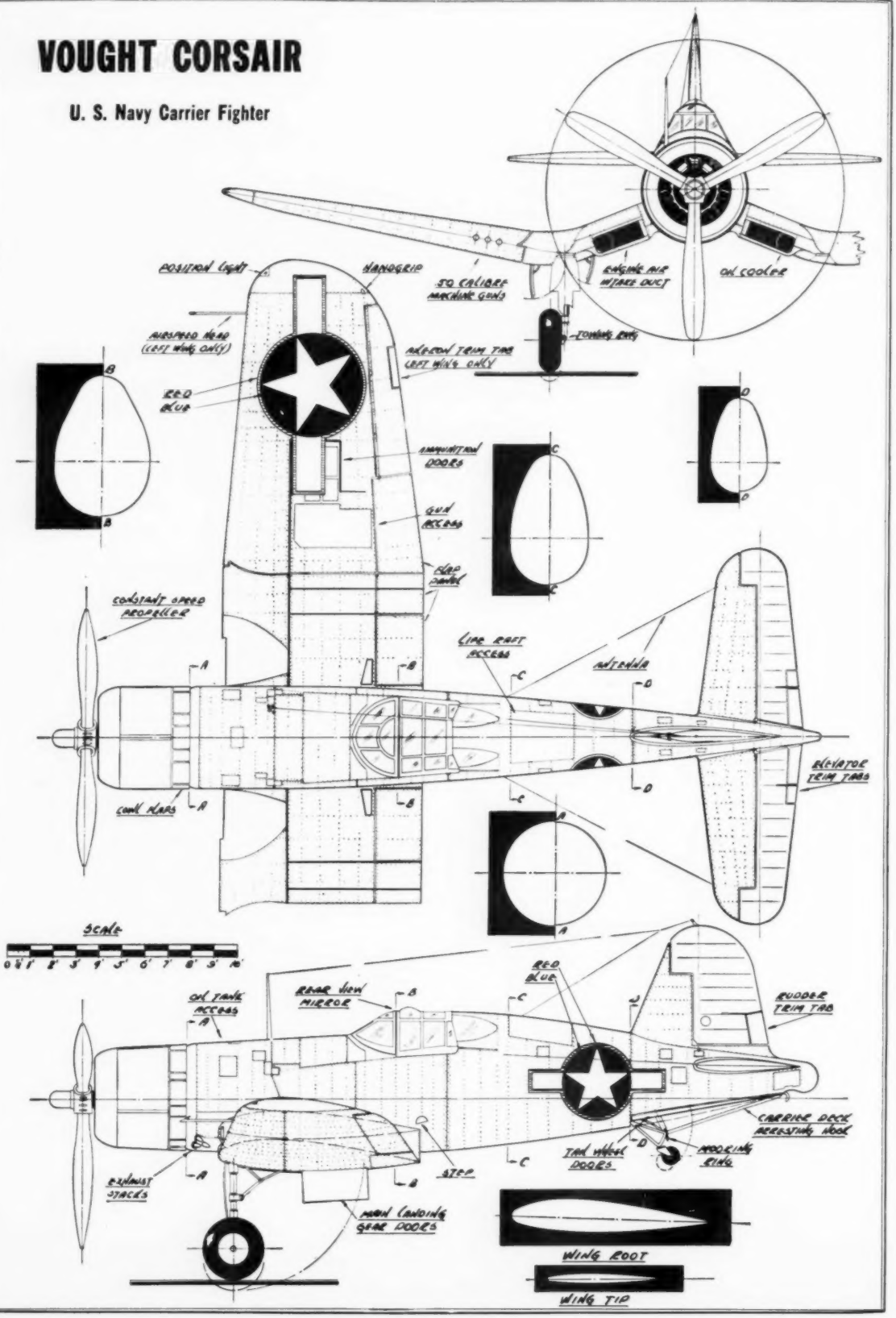
Parachute bombs go into action against Munda

Before and after a Beaufort attack on enemy transport


Scale
Handley Page
O/400
2-375 hp Rolls-Royce at 1080 r.p.m.
~and Other Alternative Engines of Like hp
Speed at Sea Level ~ 97 mph
" " at 10,000 ft ~ 93 mph
Landing Speed ~ 50 mph.
Climb to 10,000 ft in 25 min.
Full ~ Load
100'
Walks on Lower Wing
Position of Wings When Folded
10'
22'
Perspective View of Right Nacelle
(Not drawn to scale)
67'6"
15'
Outer Panel Omitted For Clarity

# VOUGHT CORSAIR

**U. S. Navy Carrier Fighter**



# CORSAIR

ONE of the least-known "behind-the-scenes" aircraft designers and manufacturers has been Chance Milton Vought, whose name approaches legend with the United States Navy, for Vought designed and built planes have been the back-bone of Naval Aviation since its inception. The famous name has been preserved, however, in the tremendous organization responsible for the Vought Corsair, our Plane on the Cover this month. The present Vought Division of United Aircraft Corporation bears little semblance to the handful of designers and builders who took part in creation of the early machines bearing that famous name, but the present Corsair is as surely a descendant of its renown forebearers as are such machines as the Curtiss Warhawk, the Douglas Skymaster and the Martin Marauder.

Chance Vought was born on February 26th, 1888 in New York City and, after acquiring a general school education, entered the new and mysterious field of aeronautics. He became an active pilot in 1911 being awarded International Aircraft Pilot's License No. 156. Shortly thereafter he became associated with the Wright Brothers as an engineer-designer and to his credit goes such planes as the PLV biplane, the Mayo biplane, the Simplex 3 place flyingboat and the famous Wright Model "V" military biplane, as well as the Wright Hispano flyingboat.

When the Wright-Martin firm was formed he became Chief Engineer and in 1917, at the height of the first World War he became partner to the Lewis & Vought organization. His first design was the Lewis & Vought VE-7 Bluebird biplane trainer which won the U.S. Army Air Service's first competition for training machines in 1917. Vought machines followed in progression, each a more advanced type than its predecessor. The

## Plane on the cover

VE-8 was a single seat pursuit plane, the VE-9 an advanced trainer, the VE-10 a flyingboat and the VE-11 a special pursuit single seater. A special version of the Vought VE-7, known as the VE-7-SF, was adapted for turret takeoff at the time when battleships mounted tiny platforms on their turrets for aircraft takeoff. (For a complete story of Naval Aviation Carrier Fighters, see page 6.)

The Chance Vought Aircraft Company was formed after the Armistice and the UO-1, a catapult observation machine quickly converted from landplane to seaplane and vice versa, was produced. This plane was the foundation for a vast series of cruiser and battleship catapult seaplanes as well as landplanes and, known as the Vought Corsair; these biplane two-seaters characterized our ship-based Naval Aviation for over 15 years. From the UO-1 came the O2U-1 series, the O3U-1 series and various experimental versions of the O4U-1. The VE-7 was modified into the FU-1, the Navy's first single seat designed-for-the-purpose fighter. The F2U-1 was produced in 1928 as a special fighter version of the standard Corsair and the F3U-1, developed in 1933, was designed to meet Bureau of Aeronautics Specification No. 113, a competition for two-seat Navy fighters. Although the Navy did not purchase any of the several planes submitted for tests, the F3U-1 was developed into the famed SBU-1, which was ordered in considerable quantities for carrier scout-bombing duties.

The F4U-1 was first produced in 1939 as a superfast Navy carrier fighter and was submitted to the Bureau of Aeronautics' testing base at Anacostia, D.C., for experimental analysis. The plane has been undergoing extensive modification, tests and resultant improvements and has, after nearly four years of development, emerged as the famous Vought Corsair fighter, now battling the Jap Zero in the Southwest Pacific, Chance Vought was, in every respect, one of America's true aeronautical pioneers. Vought machines have, at one time or another, established four world's altitude and speed records. Vought, himself a man of exceptional vision, wrote "Aero and Hydro", a magazine devoted to scientific research in aerodynamics and hydrodynamics, two closely akin subjects, commencing in 1914. He was a member of social and professional societies and had two sons. His death at Southampton, Long Island on July 25th, 1930 brought to an end a fabulous and worthwhile career. It was assuredly Chance Vought's spirit that created one of today's deadliest carrier fighters: the Corsair.

The design requirements for carrier fighters are the most exact of Naval specifications and in few other designs does the engineer have less leeway in the basic layout of his plane. Carrier takeoffs, obviously, are limited and to a great extent this fundamental requirement exceeds most others in importance. Quick takeoff can be obtained either with low wing loading or low power loading but such attributes of an airplane are dilatorious to performance resulting in slow top speed, one of the necessary requirements of today's combat planes, most particularly fighter-type craft. Since low wing loading can only be obtained with a proportionally great amount of wing area for a given weight, which would make the plane unsatisfactory for carrier use where storage space is at premium, low power loading was the only answer.

*(Continued on page 34)*

# TRANSATLANTIC CARGO GLIDER

*by* **EDWIN CASSIDY**

The famous "Voo-doo" but this is just a model of the record-breaker

NOW you can build a detailed model of the U. S. Army Air Forces cargo glider, Waco CG-4A, the ship that crossed the Atlantic Ocean and flew 3200 miles in 28 hours, carrying vaccine and other cargo. This ship carried tough American troops in the Allied invasion of Sicily on July 12th and played a key role in the successful landing operations there.

First draw all plans full size. In the absence of balsa wood use sugar pine; it does the trick nicely and is very easy to work with. Select a piece of wood 12" long x 1-1/2" x 1-5/8" for the fuselage. Now trace the side view from the plans and glue the tracing on the 1-5/8" side of the block. Then trace the top view from the plans and glue this tracing on the 1-1/2" side of the block.

With a Stanley No. 68 dove-tail saw, cut saw slots through the top view down to the top edge of the penciled side view outline. Turn the block upside down and do the same to the underside. Now lay the block with the side view facing up. Cut saw slots through the side view to the outer edges of the top view outline. Do the same on the opposite side. The block now resembles a series of cubes around the outer edges of the outline. Saw these cubes off with a dove-tail saw reasonably close to the outline.

In all cutting operations the pencil outline is to be left showing on the block, it is never cut or sanded away. Use a pen-knife to trim at close quarters, then a wood file, finish off with coarse then fine sandpaper. Now lay aside the shaped fuselage until later.

The two wing panels are 8-1/4" x 2-5/16" x 5/16" each. They are cut down from 1/2" stock. Use cleats to hold the work down firmly and plane down to 5/16" with a No. 120 Stanley block plane. Trace the wing panel from the plan and glue it on a piece of cardboard. Use it for both left and right panels by turning it over.

In shaping the airfoil on the main wing panel use angles starting from where the main spar would be. Slant one towards the leading edge, and another towards the trailing edge. When it is sanded later it produces a beautiful sweeping curve. The airfoil is symmetrical from main spar to trailing edge for both upper and lower camber. Forward of the main spar the lower camber is shallower than the upper one. From the front view of the drawing you will notice quite a thick airfoil for the top camber. Keep this contour rolling forward with a deliberate drop. It is not a flat curve.

In shaping the thickness for the wing tips, cut a sharp angle and then finish the sweeping curve with coarse and then fine sandpaper. Note the sweep starts from the lower camber and raises to the tip at the top camber.

The stabilizer is made in one piece from stock 4 x 1-1/2" x 3/16" for ease in handling and shaping. After the outlines are traced on it, it is cut in halves to make a left and right panel. The stock is held down with cleats while planing to the 3/16" thickness. Finish the shaped part with coarse and then fine sandpaper.

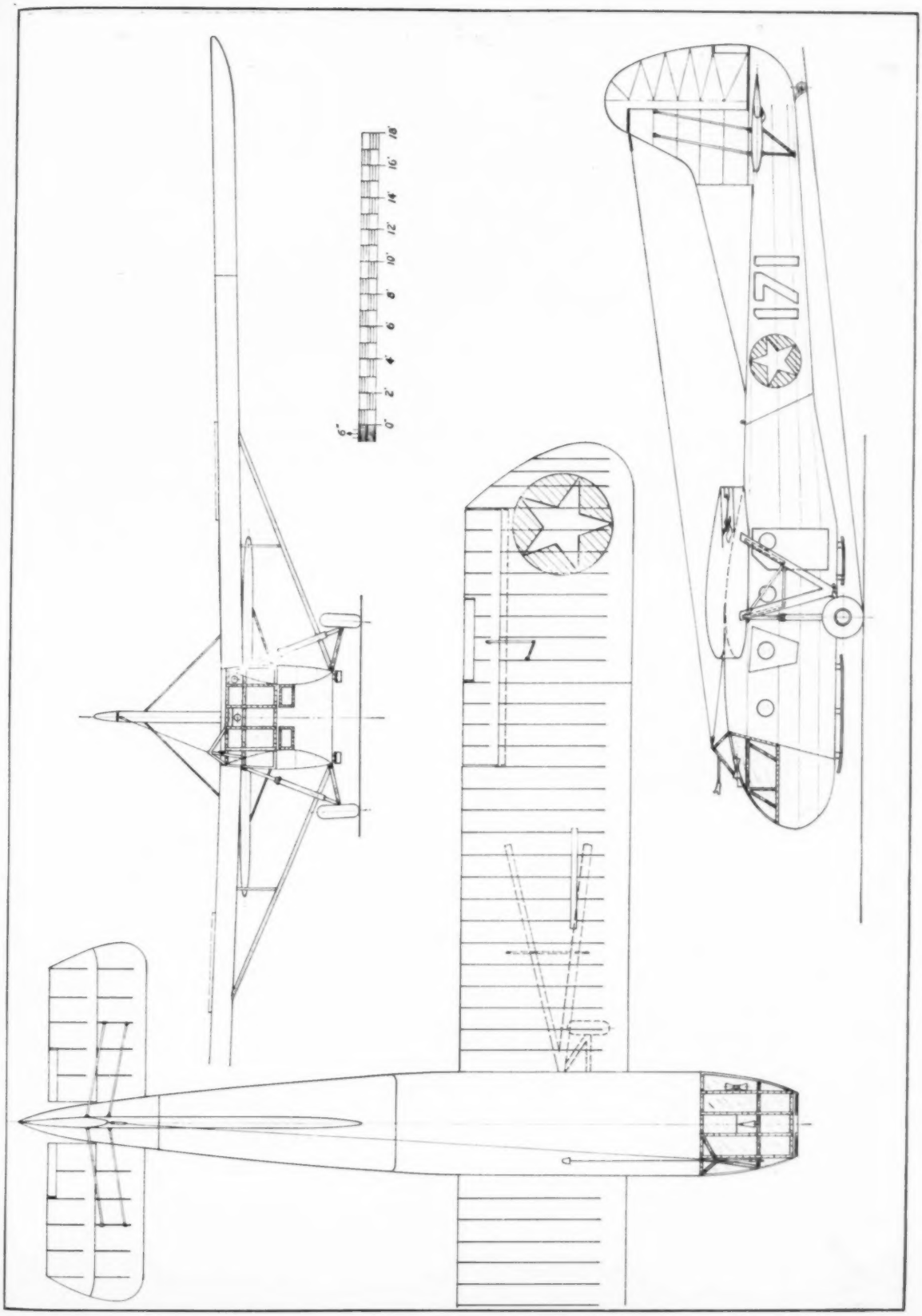
The rudder, fin and dorsal fin are made in one piece of 1/8" stock. The outline is carefully traced; shaping is done with a sharp penknife and then finished with sandpaper.

The skids are made next. The stock is 3/32" bamboo strips 1/4" wide. The front skids are 1-7/8" long; rear ones are 1-3/32" long. Do the bending with long strips first, then cut to size later. Place the ends under a hot electric iron (pressing) and bend up very slowly. Then take some 1/8" square wood stock and cut off ten tiny cubes 1/8" high and glue three cubes on each side of the fuselage front for the long skids. Glue two cubes on each side of the fuselage rear for the short skids. When dry place skids on top of cubes after some wet glue has been touched to each one. See that skids are laying level.

The landing wheels are a drop gear. A pair about 1/2" to 11/16" will do. The axel running through them is a 1/16" wire with aluminum bushings to fit and copper washers soldered on both sides of the hubs. Loop a piece of smaller gauge wire around the 1/16" axel and slide an aluminum sleeve 1/4" long over the springy open ends. Force them down to the axle and solder the loops closed. Later on the steel wire uprights are carefully pushed into the belly of the ship and glued there.

The tail wheel assembly is a piece of 1/32" wire bent like an A frame with the apex squeezed together and then bent horizontally to take the tail wheel fork which is a piece of wire, with a bushing,

*(Continued on page 60)*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6"
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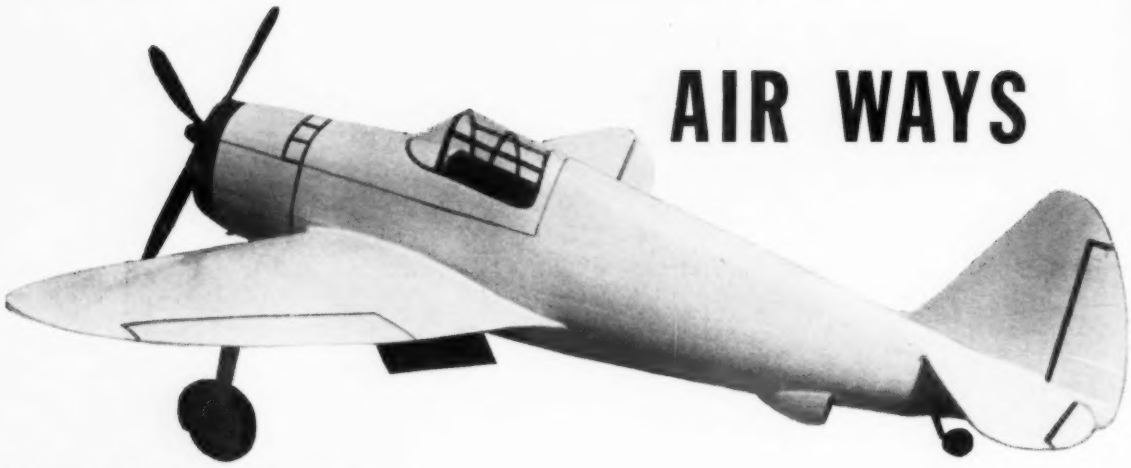
# AIR WAYS



No. 1 Frank Spain's U-Control Thunderbolt

No. 2 A sturdy boom pylon job

No. 3 Todisco's cabin monoplane

No. 4 The old and the new in models!

No. 5 Bert Smith pilots his Gee Bee

**News of model plane experimenters from all parts of the world**

WHAT will victory in World War II and the peace to follow mean to the modeler? What does post-war planning for the modeler comprise? First of all we cannot count on an instantaneous release of materials and products. When the peace is signed it most assuredly won't mean that the next day you will be able to walk into a model store and buy an engine, or rubber, or balsa or any of the countless other supplies. It may require six months, perhaps even a whole year for the model manufacturers and jobbers to reconstruct their lines of supply, to convert their factories back to peace-time model work. So none of us should look forward to a sudden unleashing of materials. The model engine manufacturers, almost without exception, are now engaged in war material sub-contract work, and at least one of them now has a large factory, completely tooled and manned, devoted entirely to the manufacture of aircraft tools. Another is now an aircraft sub-assembly plant for aircraft parts and accessories. Certainly it will take many months to convert plants such as these back to pre-war production.

Balsa (remember?) may come sooner than engines for the only real problem of the balsa supply is transportation. This light, strong wood is found most extensively (commercial quantities) in Central and South America and, whereas there is plenty of it, even great stores in some countries, there has been no way to ship it to the states for other than wartime needs. Ship-bottoms are at a premium, as we all know, and the railroads and great trucking routes are clogged with strategic priorities. With the peace will come an easing of this pressure and we can expect balsa, in commercial quantities, to become available in just a matter of a few months after the cessation of hostilities.

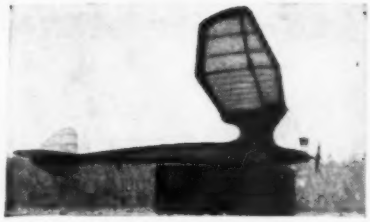
Coils, timers, batteries, etc., will also have to wait many months before they are available. The electric manufacturing companies, like the engine companies, are now converted wholly to war work. As a matter of fact, several devices originally developed for models are now being supplied to the armed forces for use in war work.

For the many builders in the services this post-war delay will not mean a great deal for their terms of service include a six-months duty following the peace. But for those others, this waiting period will mean a great deal for it will be a golden opportunity. War workers, no longer under the pressure of 10-hour schedules, six days a week, will find the leisure time they have longed for.

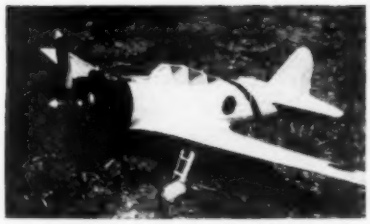
So we must prepare for a six-month extension of restrictions and lack of supply following the peace. Those six months will be periods of tremendous activity for the progressive model builder for it can be filled with experiment and study and the readying of plans for new-type models to be built when the materials at last become available. We know of countless new ideas that the originators are itching to try out, automatic stabilizing devices, radio control systems, radically different U-Control methods, new type power plants, new airfoils, etc.

We should all look forward to the peace, not only for its meaning politically and morally, but for its meaning to modelers and the vast field of design and improvement it opens.

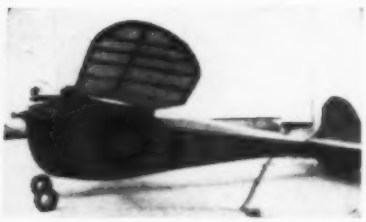
Our old friend, Frank Spain of 8106 Vicksburg Ave., Los Angeles, Calif., sends in the picture heading our column this month. It is a beautiful U-Control model of the famed Republic P-47 Thunderbolt incorporating several novel devices including retractable landing gear and tail wheel and automatically operated wing flaps. These are all controlled by a third line from the operator to the plane. Frank's model is powered by a Torpedo and the entire ship is planked with 1/8" balsa and covered with silk, giving it a beautiful finish. It is a large job and a



No. 6 The Airfoiler by H. deBolt



No. 7 A Jap Zero gas job by B. A. Smith



No. 8 The Flounder from Aug., '41 issue

marvelous piece of workmanship. Spain is a designer in the Engineering Department of Northrop Aircraft and, in addition, does lecture work on aerodynamics and aircraft design in the company school. Let us hear more from you, Frank.

Picture No. 2 comes from S. S. Messiter and shows his original twin-rudder, boom, pylon job which weighs 9 ounces. The boom is built up of 1/2" square balsa and extends half-way into the fuselage. Powered by an Atom, Messiter's plane was designed for ruggedness and the swept-forward landing gear is insurance against wash-out and that maddening bending back of the gear. He states that his ship has come in at 45° and has made a safe landing.

Salvatore Todisco of 10 34th Ave., Long Island City, New York, sends in picture No. 3 of his original gas job. The ship is extremely well designed and has good flight characteristics. He also states that he built a Thermo, plans for which were published in the May, 1943 issue. However, on the fifth flight it crossed the East River and sailed out of sight. Undaunted, Salvatore says he's going to build another and hopes that it isn't as good as the first!

One of the most interesting pictures we've ever published is that shown in picture No. 4, sent in by John Woolley of Menomonie, Wisconsin. It shows, graphically, that models, too, have progressed, and how! The old Bleriot was built in the early 'twenties by Ralph Bongey, who is now principal of the Menomonie High School. Woolley discovered the model in a store room of the Physics Lab and, after no one could explain where it came from, he went to the Principal's Office to find out. He says he got quite a lecture for it turned out that Mr. Bongey was the builder! It was constructed of gumwood strips, wire brads and fine copper wire. The wing was covered with yellow silk. The rudder was adjustable and, believe it or not, it has real airwheels, one of the first ever built. Woolley built a new wing and a new propeller but he dares not fly it for fear of his school principal's wrath should it crack up! Mr. Bongey states that it flew a block years ago when launched from a third story window.

The other plane is, of course, an Ohlsson "60" powered Super Shark, which presents an extreme contrast to the Bleriot. Incidently, Woolley is now in the Marine Corps and we wish him the best of luck!

Picture No. 5 is a bit of clever photography showing Bert R. Smith, of 632 Westfield Street, West Springfield, Mass., piloting his model Gee Bee "City of Springfield." The plane was made from a commercial kit and the picture of Bert was glued into the plane. An old idea but a good job of it, don't you think?

H. deBolt, of 52 Hirschfield Drive, Williamsville, New York, tells quite a story in connection with his Class C Airfoiler shown in picture No. 6. The model was launched full power, after a series of throttled test flights, and it sailed off on a thermal. After following it for about 20 minutes, she sailed into a cloud and was lost. Imagine deBolt's surprise when he received a phone call two weeks later stating that his Airfoiler had been found in Canada about 30 miles away! He had considerable difficulties with the customs in getting his model back which shows that even a model can cause international complications in this modern world. The Airfoiler is powered by a Forster "305" and uses the Grant G-10 airfoil with a loading of 8 ounces. It has an aspect ratio of 7 and the fuselage is also of airfoil shape. The wing has an angle of incidence of 7° which gives it slow flying characteristics but terrific lifting ability.

Picture No. 7 shows B. A. Smith's Jap Zero fighter. Smith, who is now an Aviation Chief Metalsmith in the Navy, recommends a way of making model tires by using toy golf balls from a toy golf set. He squeezed them together by a washer riveted on the ends of a piece of 1/8" tubing. The markings on the golf balls look exactly like the tread of an airplane tire. The Zero is powered by an Ohlsson "23" and is a U-Control job with a top speed of less than 40 miles per hour for B.A. states that he doesn't like high speed control models prefering slow flying and slow *landing* jobs.

If you recall the Founder, a neat Class A job published in our August, 1941 issue, you will recognize picture No. 8. This model is the handiwork of Ralph Gould, Forrest, Illinois, who says he particularly wants Peter Sotich in Chicago to see it. It is powered by an Ohlsson "19" and is a faithful replica of "Pinky" Fruchtman's original design.

Well, again the Pou de Ciel, one of the most wierd flying machines ever successfully flown. Picture No. 9 shows it in model form as built by Kenneth Tebay, who is now in the Air Forces at Sheppard Field, Texas. This Pou is powered by a Class A Atom and has a 30" wing span. Ken says: "It is not a contest ship but it flies quite smoothly under full power."

Picture No. 10 shows Ed Stewart's Pacific Ace, which is powered by a 1/5 horsepower Mighty Midget. Ed, who

*(Continued on page 50)*

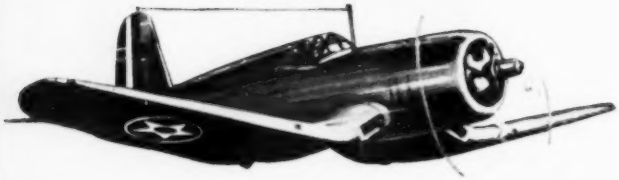
No. 9 The Pou de Ciel is still with us!

No. 10 Ed Stewart's tapered-wing model

No. 11 A Navy F11C-2 fighter to scale

No. 12 Pvt. J. A. Reynold's hot U-Control

No. 13 The Thermic 50 by John Zaic



**CORSAIR. F4U Navy Fighter** This speedy Navy fighter is a favorite with model builders everywhere. This kit makes a fine big model with a 38 inch wing span.
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See Page 1

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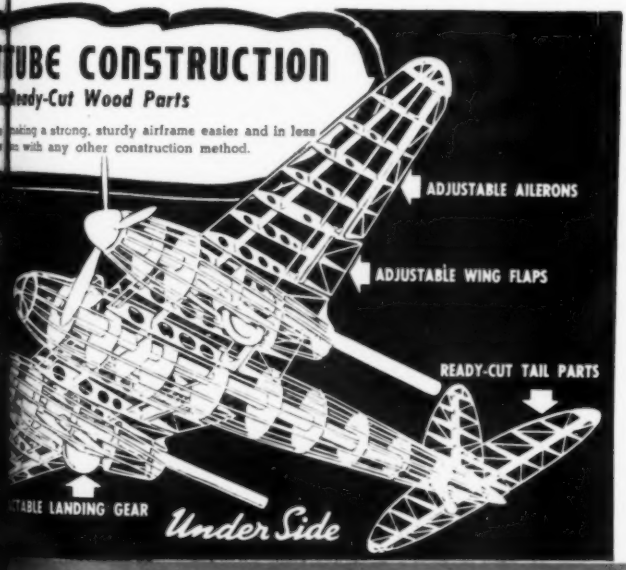
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ADJUSTABLE WING FLAPS
READY-CUT TAIL PARTS
TABLE LANDING GEAR
Under Side

D'ATIONAL ★ ★ ★ ★ ★ ★

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## Corsair

*(Continued from page 27)*

Rex B. Beisel, Chief Engineer of Vought-Sikorsky at the time (now General Manager of Chance Vought Aircraft) set out to obtain the most powerful air-cooled radial engine (a Navy requirement since 1930) obtainable and the mighty Pratt & Whitney Twin Wasp R-2800 double-row radial was selected because of its 2,000 horsepower. This engine is equipped with a two-stage two-speed supercharger of the gear-driven type. To absorb this tremendous power and convert it into useful work was the next problem; this required the design, by the Hamilton Standard Propeller Division of the firm, of the largest propeller ever used in a fighter. With these two items decided upon, the problem resolved itself into designing the smallest possible fighter plane around them. That huge propeller at first posed a problem in landing gear design, for it meant that, with the standard 18" propeller clearance, the plane's centerline would have stood excessively high above the ground, giving it the stilted appearance of a heron. This problem was solved by dropping the wing down from the fuselage in an inverted "gull" wing design. This permitted installation of a landing gear of normal dimensions and did not interfere greatly with the plane's aerodynamic properties. As a matter of fact it was an improvement insofar as surfaces meeting at right angles in the clipstream need not be streamlined, thereby eliminating the "wetted" area of a large fairing.

The Naval Aircraft Factory, Philadelphia, Pa., in conjunction with Fleetwings, Inc. of Bristol, Pa. (now a subsidiary of the vast Henry Kaiser enterprise) developed a satisfactory method of spot welding aluminum which has been adapted, on a production basis, to the Corsair. This speeds production tremendously as well as provides a much smoother skin surface than even flush riveting would have provided.

The fuselage is built up in four sections, the powerplant section including the engine, the main section housing pilot and main spar fittings, the aft section between pilot and tail and tail section including all the empennage units. These sections are assembled individually with heavy, pressed flange bulkheads, extruded stiffener section stringers and heavy sheet skin plating. The skin takes a greater portion of the load than heretofore, there being few longitudinal members to distribute the load. This combination of heavy frames and thick skin has eliminated use of excessive stringers, thereby simplifying construction through the lessening of riveting and spot-welding time.

The wing is built in three sections, the center section being an integral part of the fuselage main section. The wings are the folding type for carrier deck storage and are folded hydraulically, jury struts being placed between wings and fuselage in the folded position to secure them in place. The wing front spar of the fuselage main section is formed in a gentle series of curves to provide for the gull-wing form. It is of the truss type with heavy formed capstrips inter-connected by flanged hat-shaped stiffeners. The outer wing panels taper in both planform and thickness are of metal structure, spot-welded sheet covering. Flaps are the trailing edge type hydraulically operated. The landing gear rotatoes 90° upon retraction lying flush with the wing surface. Large metal doors completely seal the recesses provided upon retraction. The tail wheel is full retractable and the opening is covered by large metal doors extending from the tail wheel to the tip of the after fuselage. The deck arrester hook is mounted on the tail wheel in such a manner that when the tail wheel is extended the deck arrester gear is exposed and lowered by the pilot. The entire assembly is completely covered by the large doors upon retraction.

The powerplant section of the Corsair is one of the most interesting features of the design. The use of the two-stage two-speed supercharger posed induction system problems. This type of supercharging makes use of two blowers, one on either side of the carburetor. Air is taken into the auxiliary or second stage of supercharging from ducts located in the leading edge of the wings in the gulled portion. This air is routed into the blower, which has a two-speed gear shift similar to that on an automobile, permitting use of either "Low" or "High" blower speeds and resultant air pressures. Compression of this air heats it requiring the use of inter-cooling, a simple air radiator which cools the heated air without losing its pressure. This is made possible through the use of a "two-way" radiator with cold air from the wing leading edge blowing through at right angles to the tubes containing the heated air from the blower.

After being cooled the air is routed into the carburetor where it is mixed with fuel and thence into the main stage of supercharging. This main stage blower, although still further supercharging the air, is primarily a diffuser wheel which whirls the air-fuel mixture into the 18 intake manifolds in smooth, even doses.

Within the ducts in the gull leading edge are also located the oil coolers which are equipped with automatic thermostat controls by which cool oil is bypassed and only warm oil is routed through the radiator for cooling.

The Corsair has a wingspan of 41 ft. and is 33 ft. 11 in. long.

Armament aboard the Corsair consists of .50 caliber machine guns, a lethal stream for a Jap Zero to run into.

So confident is the Navy Department of the Corsair's power that even greatly expanded production facilities at the Vought works at Stratford, Connecticut could not provide the quantities desired and contracts were let to the Brewster Aeronautical Corp. in New York and the Goodyear Aircraft Corp. at Akron, Ohio, for quantity production. Although identical in every respect to the F4U-1 produced by the parent organization, the Navy has given the Brewster version the designation F3A-1 and the Goodyear version the designation FG-1, just to keep the records straight. It's still the Corsair, however, to the Navy flight officers and mechanics and to Jap pilots!

Tooling for Corsair production presented a huge task, not only in the quantity of work involved but in the most efficient types of tooling as well as plant layout. There are more than 6,400 formed parts in the Corsair which require more than 30,000 drill templates and fabrication fixtures. There are more than 2,000 tools used for drilling operations alone!

The Vought production line is a giant "loop" with two lines on one side of the loop flowing into a single long final assembly line. The two lines are sub-assembly lines, one used for installation of items in the fuselage mid and aft sections, the other for installations of center wing and front fuselage sections. These lines are all divided up into a series of "stations" useful for determining at what point a given item is placed on the ship. In all there are 71 stations, 41 for sub-assembly work and 30 on the final assembly line. The first 20 sub-assembly stations are for the installation of "plumbing," the countless series of lines necessary for the operation of the airplane's items of equipment. At the 21st station the front and rear fuselage sections are bolted together and the powerplant (already assembled including engine mount, engine and all accessories), outer wing panels and landing gear are installed. Eight more stations are required for installation of the sliding cockpit hatch, landing gear doors, air induction system, armor plating and the bullet-proof self-sealing fuel "bags" (as distinguished from the old style metal "tanks").

At the 31st station the Corsair is ready for preliminary testing of its various systems with electric pumps supplying the power normally provided by the engine pumps. The next five stations are used for testing the hydraulic system, including the operation of the landing gear, the engine cowl flaps, the tail wheel and the folding of the wings. The next two stations are occupied with rigging the tail surfaces to the correct tolerances and the preparation of the engine for its first ground installation run. The final stations include a complete final inspection of the completed airplane and the painting by spray guns of the wings, fuselage and tail surfaces. The completed Corsair, ready for its first flight, is then towed across to the airport and put through its paces. It is then turned over to a Naval Aviation ferry pilot who flies it to one of the Naval bases preparatory to its delivery to a carrier or to a cargo ship.

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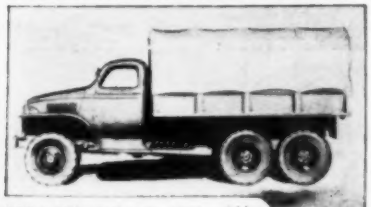

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## Flash News

*(Continued from page 2)*

equipped to do the job on the basis of their equipment, their personnel, their facilities and their performance record. This is like choosing the one best-drilled Rockette on the stage of the Radio City Music Hall! England's solution (as well as Canada's) appears to be simple: the government will operate the line. In America this idea wouldn't get to first base on the surface but it appears that, at least basically, this will be our solution. Through huge loans the government today participates in the airlines, and this hold will be strengthened by the granting of route certificates containing clauses and provisos which the grantee must accept or: no certificate! When this one great hurdle has been crossed the world's future airlines will grow into fantastic networks of scheduled air transportation undreamed of even in this period of post-war dreams. Let us hope that so magnificent an epoch as the coming Air Age will not be delayed nor marred by bureaucratic meddling.

The United States Navy has announced that "approximately" a dozen new aircraft carriers, launched since Pearl Harbor, are now poised "for new pile-driver blows against the enemy." The first of these blows has fallen on the Japs' Marcus Island which was subjected to an unparalleled aerial bombardment by carrier-based fighter and bombardment planes. The new carrier fleet does not include "a large but undisclosed number of 'baby flat-tops' designed for convoy and ferrying as well as combat duty."

General Henry H. Arnold, Chief of the U. S. Army Air Forces, and Deputy Chief of Staff of the U. S. Army, has made repeated references to new "super" bombers which are now under construction. These bombers are bigger than the present Flying Fortresses and carry over twice the bomb load with heavier guns and longer range. Arnold states that the Thunderbolt (Republic P-47) is better than the Spitfire for bomber-escort work because of its longer range; the Lightning (Lockheed P-38) runs it a close second.

This war continues to announce cold, hard facts which approach incredulity on the basis of year-old points of view. Consider the recent announcement that a total of 307 Luftwaffe fighter planes were shot down by Flying Fortresses in a single day. This total did not include the "probables" or "doubtfuls" nor did it include 20 enemy fighters downed by escorting Thunderbolts.

The War Department has permitted certain details to be released to the press on one of its most closely guarded secrets: the Anti-Submarine Patrol. Recently announced was the sinking of 10 German U-boats in the Atlantic out of 13 attacks. These patrols were carried out by Consolidated Liberator (B-24) bombers especially equipped for the purpose. Carrying huge fuel loads to permit long cruising ranges, the giant four-engine bombers attack the submarines with depth charges and bombs as well as gunfire from their nose and tail turrets. Evidence of the scope of these operations is revealed in one bomber's successful attack while 1,000 miles at sea!

News of the North American Mustang (P-51), rated by many war fliers as the best all-around fighter in action, comes from two sources. J. H. Kindelberger, president of the giant North American network of plants, states that the installation of Rolls-Royce Merlin engines in the Mustang has raised the top speed above the "400 miles per hour plus" previously claimed. The Packard Motor Car Co., American producers of the British Merlin, claim that the engine has raised the fighting altitude of the Mustang "two miles" higher. The addition of 10,560 feet of service ceiling to the Mustang would definitely bring it into the high altitude class and with the additional speed, we may justly claim that it is soon to become one of the most deadly fighting craft of this war. Latest version is armed with four 20 millimeter cannon firing explosive shells!

A report has been received that a pilotless German plane crashed recently on Bornholm, a Danish island in the Baltic Sea. According to the newspaper Aftonbladet (Stockholm), investigators could find no place for a pilot in the plane giving immediate credence to Nazi reports of a secret air weapon. The idea of radio-controlled airplanes is not new, nor is their actual construction and use, largely as target planes. However, the use of such a plane in combat, possibly controlled from another airplane at a safe distance, suggests many possibilities.

One of the most difficult tactical problems to date has been the rapid and easy identification of friendly ground units by airmen joining in the attack. Once in action, tank and mechanized infantry battles soon lose all semblance of order and "lines" become jumbled masses of enemy and friendly vehicles. The War Department recently revealed that this problem had been solved by the issuance of large numbers of cannisters which fire multi-colored smoke patterns into the air. In a variety of colors, codes are worked out in such a manner that the enemy cannot successfully imitate the procedure. A given day, the code might be red-2 yellows-and a green and the following day the colors might be changed to 3 blues and 1 white. The codes can be issued covering a period of several days or periods of only morning and afternoon. Such a procedure greatly lessens the possibility of low-flying intruder aircraft firing on their own forces below.

The 30th anniversary of Naval Aviation was recently celebrated and a review of its history contains a panorama of air-sea power's growth and development. From a force of only 38 officers and 54 planes at the beginning of the first World War, Naval Aviation today claims a full one-third of the total naval personnel and operates no less than 27,000 planes in all theaters. It took thirty years, however, for it to reach its present full recognition by the Navy Department itself with the recent appointment of its

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| 7" 15c | 9" 40c |
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| 9" 21c | 11" 40c |
| 10" 25c | 12" 40c |
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Asst'd col., dz. 35c
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1/16"x12" .....
.....6 for 5c
⅛"x18" .....3 for 5c
3/16"x18" ea. 4c
¼"x18" .....each 5c

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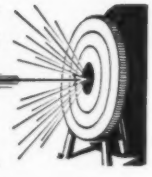

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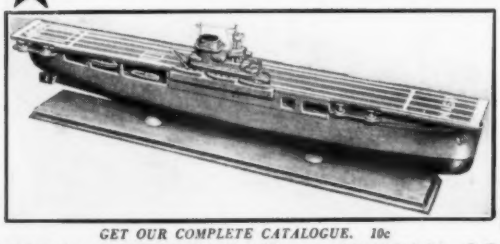

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first Deputy Chief of Naval Operations, the creation of which post has been the goal of Naval Aviation officers for the greater portion of that 30-year period. Although held by Vice-Admiral John S. McCain, formerly Chief of Naval Aviation, all due credit for the move goes to Rear Admiral John H. Towers, who fought so long for recognition of his branch of the service. Now "somewhere in the Pacific" on duty in an advisory capacity, it is strange he should have been removed from the Bureau of Aeronautics just as victory in his fight loomed. For a complete history of Naval Aviation, we suggest you turn to page 6.

One of the most significant indexes to the progress of the War in the Pacific is the recent announcement by Secretary of the Navy Knox that one-third of the total of Japan's shipping tonnage had been sent to the bottom. That Japan must rely fully on these shipping facilities to hold her far-flung but ill-gotten Pacific empire together is a known fact and, together with airpower, without it her economic and military structure in the outposts of the Pacific is doomed. According to the Navy Department, Japan's shipping amounted to an aggregate 6,368,891 tons as of December, 1941. The Japanese have built or acquired an additional 1,250,000 tons since Pearl Harbor, or a grand total of 7,618,891 tons. If, as Secretary Knox states, we have destroyed one-third of this, a total of 2,539,630 tons of Japanese shipping now lies at the bottom of the Pacific. The inroads on her airpower by General MacArthur's fliers and General Chennault's forces in China have been considerable. Such losses in her two most vital factors of defense cannot long be supported by ground troops and installations and the impending doom of Japan has become a certainty. As in Europe, it remains now for only time to set the day and hour for totalitarianism's defeat.

Grover C. Loening, famed amphibian designer and now special aircraft consultant to the War Production Board, has recommended large scale production of the fabulously big Martin Mars flying boat in its revamped version of flying cargo plane. The Mars, which has a wingspan of 200 feet and carries a tank car load of gasoline, is now the center of discussion between the Navy and the Martin firm. Already negotiating a contract for an unspecified number, the Navy now has the recommendation of Loening that the quantity should be vastly increased.

The production of warplanes in August totalled 7,700 planes and War Production Board experts confidently expect that a total of 8,000 planes will be produced in September. Such is the index of the United States' production of fighter, bomber and training craft. It is of interest to note that statements concerning failure to meet quotas mean little or nothing and the wave of pessimism that sweeps certain circles when such statements as: "Warplane production down 6%" means absolutely nothing. When quotas are set, they are frequently figured out months, sometimes a whole year in advance. Such

long-range predictions cannot possibly foresee airplane design changes, necessitated by changes in tactical requirements at the front. The addition of a small item of equipment is sufficient to slow down production of a bomber as much as 10% in a single month. The change-over from a "P-83C" to a "P-83D" may cause a lag of 15% in production for a few weeks. One official, for some reason nameless, says wisely: "I'd rather see us make 6,500 planes of the type we need than to meet schedules which include many types we don't need and would rather not have." And it is important to bear in mind that with the shift in production emphasis to long-range heavy bombers must irrefutably come a falling off in scheduled production quotas based on the smaller types. Obviously, it takes three or four times the man-hours and material-tonnage to build a giant bomber than it does to build a fighter or even a light bomber. We are now outproducing the entire Axis in warplanes.

The generals aren't forgotten when it comes to awards for merit, although they rarely shoot down an enemy plane, wipe out a machine-gun nest or capture an enemy soldier. Four air officers were recently honored: Maj. Gen. Lewis H. Brereton, commanding general, U. S. Army Ninth Air Force, has been awarded the Air Medal, largely for the damaging Ploesti raids. Maj. Gen. James H. Doolittle, commanding general, Northwest African Strategic Air Corps has been awarded the Distinguished Service Medal for his brilliant "softening up" bombardment of Tunisia followed up by paratroop landings. Maj. Gen. Ira C. Eaker, commanding general, Eighth Air Force, has been awarded the Legion of Merit for his brilliant organizational work with the arrival of the first Yank bombardment and fighter groups in England. A comparative unknown, Brig. Gen. Uzal G. Ent, commanding general, Ninth Air Force, has been awarded the Oak Leaf Cluster to the Distinguished Service Medal for his exceptional work in command of air units attacking Ploesti, Greece and other Middle East and Mediterranean targets.

Flight Officer Maurice L. Plummer, of Indianapolis, Ind., had dreams of a Nazi internment, brutal floggings and black bread and water when he brought his conked-out Curtiss P-40 Warhawk down to a rough landing and found himself immediately surrounded by German troops of the Wehrmacht. The Germans took Plummer to a nearby house where he was gently told that he had merely landed in a large Axis prison camp in Sicily, his German "guards" being "guests" of much tougher American guards!

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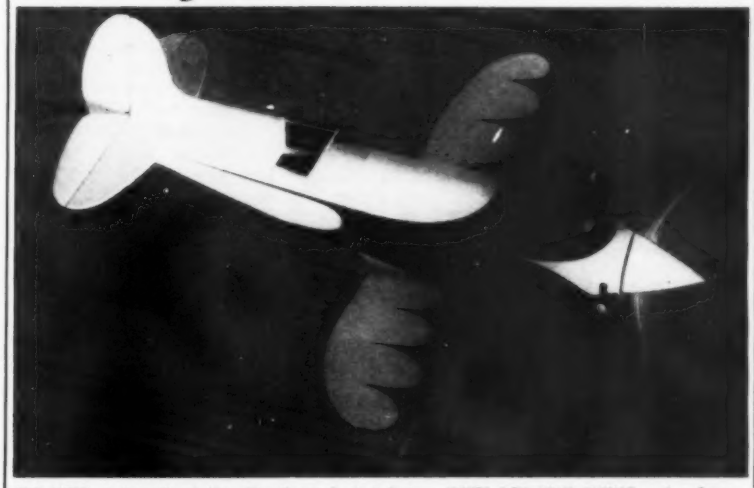

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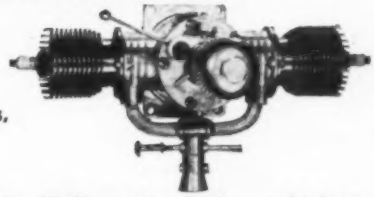

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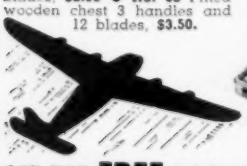

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## The Glide

*(Continued from page 9)*

to the glider's surfaces we note that the tail is now developing a force due to its new angle of attack. Small as this may be the long tail moment arm will bring the glider into the new airflow direction and out of a straight down dive.

The glider is still presenting its lowest resistance "face" and it still has plenty of speed so that the wing keeps on developing forces perpendicular to the airflow and of fairly high value because of diving speed. The direction of the glider and airflow is being constantly changed by the "lift" of the wing and pull of gravity. This change keeps on affecting the tail or stabilizer so that it keeps on forcing the nose away from the dive to a horizontal position.

This by-play between the "lift" of the wing, pull of gravity and levering of the stabilizer continues as long as the glider moves fast enough to enable the wing to produce "lift" of greater value than the weight of the glider. But since this forward movement is the result of lift and weight (pull of gravity) it is evident that this situation cannot exist long. In fact, as the lift force changes from horizontal to almost vertical it provides less and less force for "side" motion as the glider approaches its normal gliding angle, and the forward force diminishes until a point of balance is reached.

If you kept checking text with diagram you should have no trouble in following the steps by which the glider began and zoomed out of the dive. In fact, that is about all we explain: the automatic recovery out of a dive. Yet it explains how the particular forces (wing and gravity) produced forward motion. And this explanation is of major importance as it clears up the mystery of how a glider acquires speed so that it may glide. Without forward motion, all is lost. If you gain nothing else but learn how forward motion is produced by wing and gravity you will be more than repaid for the time spent.

We have now almost reached the situation shown by the standard glide diagram. However, the forward speed resultant developed by lift and gravity still provides excess speed so that the airflow will cause the stabilizer to nose up the glider. But soon the critical point is reached. The speed is just right for the wing. Anything that may tend to force the nose down will cause an increase in speed which in turn will make the wing develop more lift and change the airflow so that the stabilizer will bring the nose up to normal. If on the other hand the nose is pulled up for some reason or other after reaching the critical speed, the "lift" will not be able to supply enough forward speed because the "lift" force will be almost vertical. Unless correction is applied the speed will keep on decreasing. With slacking of speed the lift will also decrease and eventually the pull of gravity will take over and the glider will become like any other object and fall down and repeat the cycle.

Thus is the glide achieved. The "lift" of the wing in combination with the pull of gravity form a resulting force which gives us forward speed which enables the wing to produce lift.

There are more interesting facts about the glide. They deal with the finer points and they will be covered later on in their proper place. Until next time: May the thermals be at your beck and call!

VICTORY

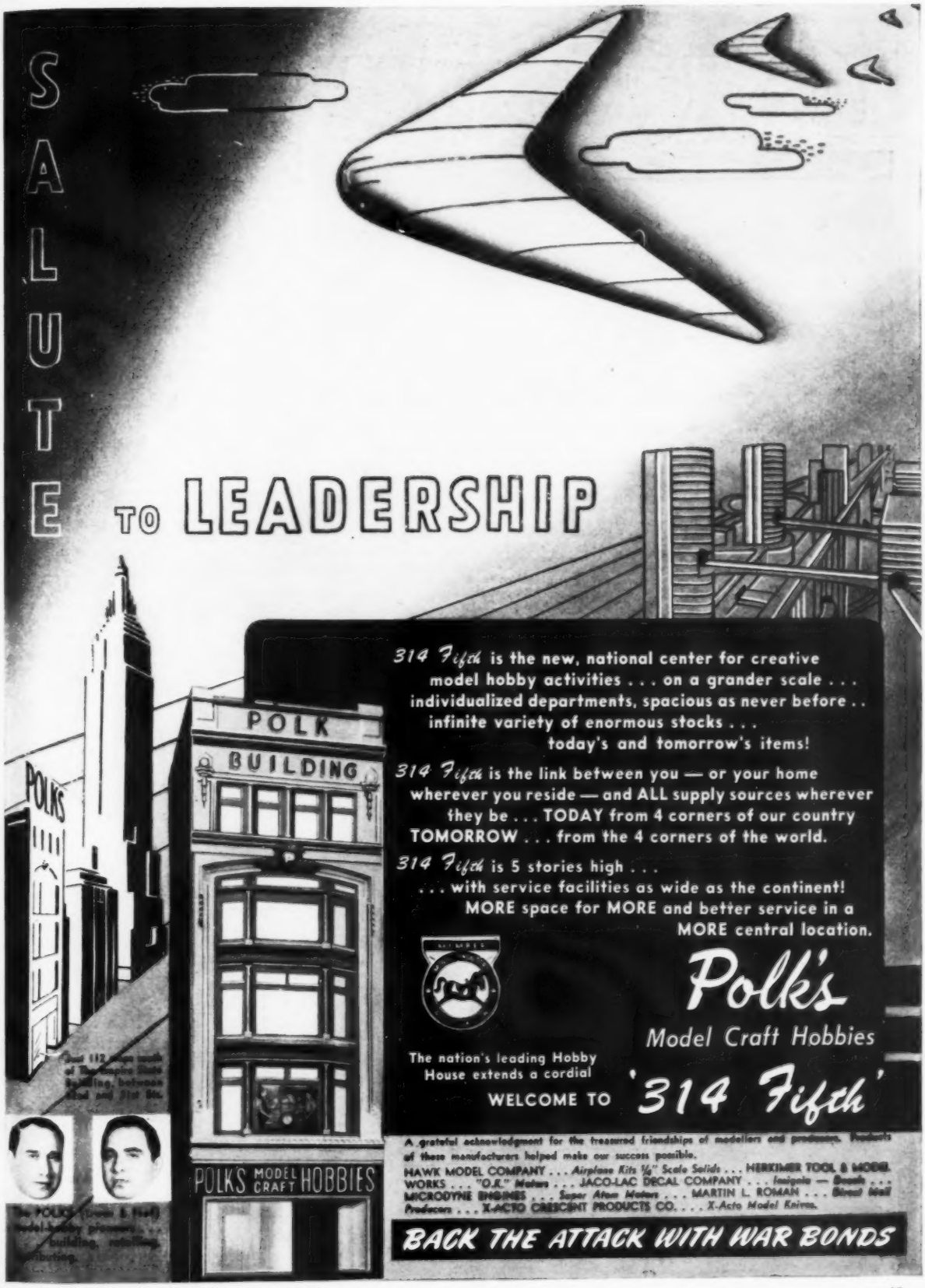
## Design Forum

*(Continued from page 21)*

already determined once and for all a wide variety of details about the airplane in mind. For instance, if you have decided on a bomber to bomb Tokio you have instantly determined the distance it must fly, the amount of gasoline it must carry, the size and weight of the airplane, its take-off distance and a dozen other items. While this may not be immediately evident to you as this series progresses you may check back and see exactly how much truth there is in this statement.

Design No. 1 this month is for a high altitude fighter which features the location of the propellers turning within slots in the wing panels. In addition it contains a cannon in the nose, a movable machine-gun in the aft portion of the crew compartment and remote-control guns in the tail. The wing span of 65′ and the length of 50′ show a clear conception of the size necessary for an airplane which could carry this various equipment. However, the chief point of design is the propeller location, the reason for which is not immediately obvious. However, it should be obvious that such a location of the propellers would completely disrupt the airflow over the wing surfaces. The airstream aft of a propeller is completely turbulent resulting in total loss of lift in the immediate vicinity of its flow area and insofar as this area constitutes the greater span of the wing, it is obvious that such an arrangement is faulty and that the airplane would not perform satisfactorily. The use of a single engine driving two propellers would not be satisfactory for a high speed interceptor insofar as this type depends entirely on its excess horsepower for its high rate of climb and the load placed on the engine by these two large four-bladed propellers would be too great for it to develop its full horsepower. Operating at reduced power would make the engine-propeller combination an inefficient one and the design would, perforce, be discarded. The location of the two 20 mm cannon adjacent to the pilot is poor in that the muzzle blast would seriously interfere with his vision during firing and the alternate compression-convection waves created by the explosions might conceivably cause serious injury to his auricular organs.

Design No. 2 is a high-wing single-seat fighter, the work of Stanley Green, 1141 Rayner Street, Memphis, Tenn. The basic layout of this plane is excellent and Stan has exercised careful judgment in his design. There are only a few points

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that are unsatisfactory aerodynamically, chief of which is the location of the propellers in such close proximity to the tail surfaces. It would have been far more advantageous to have a single vertical surface for this would partially eliminate the turbulence associated with the prop wash which, with the present design, would make control difficult. The vortices moving rearward from the propellers would place excessive bending loads on the tail surfaces requiring extreme strength in their structure. The airplane would have exceptionally good lifting ability, all of the wing area being useful, but the use of drive shafts for the propellers would necessitate additional structure in the wing, thereby increasing the wing weight and wing-to-fuselage spar fittings. The necessity for this additional structure would warrant an increase in the over-all size of the design and it is doubtful if an airplane of the small size noted on the drawing would be successful. The landing gear would have to be moved further forward to allow for the pilot and the nose should be increased to give adequate space for the installation of the nose guns. The wing guns could not be used as there is insufficient space for their installation. The short moment arm for the tail units coupled with the tremendous four-bladed propeller blasts would make control difficult. The use of pusher propellers and extension shafting should be confined to the design of extremely large airplanes.

George R. Perryman sends in Design No. 3 which centers about the location of the propellers on the tail booms. George states: "I have a practical system whereby this is made possible but I would rather not disclose the plans at present." These "secret" plans are the heart of this design and since we can conceive of no practical way this mechanism could be worked out and the boom still retain sufficient strength to support the tail surfaces the success of this design will, itself, have to remain a "secret." George also states that the pilot's seat is so arranged as to permit him to lie in a reclining position when pulling out of a dive at which point the pilot returns to the normal position. He does not claim origination of this method and rightly so for the Curtiss organization has obtained a patent on just such a device. The diverging fire of the cannons is in error as, if at all, they should have a converging fire. He states that this is to take care of enemy fighters which may turn inside the turning radius of this design. This is a little far fetched and aiming would be impossible with this cannon arrangement. From our point of view Design No. 3 is impractical and also is not new, it having been attempted on the old Gallaudet pusher experimented with by the Navy during the 'twenties. In this day of high speeds and tremendous wing loadings and load factors, structural strength must be given precedence above all other considerations.

VICTORY

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*(Continued from page 15)*

sure acting inward on the plane's lateral and vertical areas. At slow speed this is negligible but at high it is excessive, increasing as the square of the velocity. Because the vertical areas are high above the center of gravity the side pressure acts well above the centrifugal force, the latter acting at the center of gravity, and causing a rolling moment inward producing excessive bank, Fig. 134. If these results are indefinite on the first test flight make a number of succeeding flights to check the plane's reaction.

The high area above the center of gravity can be reduced by using a smaller fin, also the plane will have less tendency to nose in. So replace the normal size fin with the small one, test your ship again and note any change in the flight. Probably the flight will be similar to the first one but banking and diving tendencies will be reduced slightly.

Determining the effect of lowering the lateral area is the next step and the auxiliary fin should be attached to the lower side of the frame stick directly beneath the wing by means of the rubber bands holding the pylon, Figure 137. A normal size fin and stabilizer is used as in the first test flight. It is obvious that placing this fin low beneath the stick lowers the center of vertical or lateral area to a point approximately on the center line in the motor stick, Fig. 138.

To determine proper adjustment, glide the plane and fly it once with only a few turns in the motor. When adjustments are correct test it under full power. There will be an amazing difference between this flight and the first. Excessive banking and diving will be eliminated. Though the ship will travel at high speed and circle at approximately the same degree of turn there will be little banking and the nose will remain elevated so that the plane climbs in a gentle spiral; on the whole, flight will be steadier.

The difference between the two flights is caused by lowering the side pressure due to the auxiliary fin. This reduces the rolling moment as indicated by $S_2$ and P, Fig. 135. So a very important point in the design of heavy, fast airplanes has been demonstrated.

Experienced designers of gas models give great attention to the design of the side elevation of their craft. Great care is taken to have the center of lateral area on a horizontal line with the center of gravity or, at most, only slightly above it. Banking and spiraling tendencies will be directly proportional to the distance that the center of lateral area is located above the center of gravity. In the last test you will note that the plane circled approximately as in the first test so it may be assumed that the position of the lateral area does not affect turning to a great extent.

Another way to lower the lateral area is to place the fin beneath the motor stick instead of above it. So reassemble your

*(Continued on page 46)*

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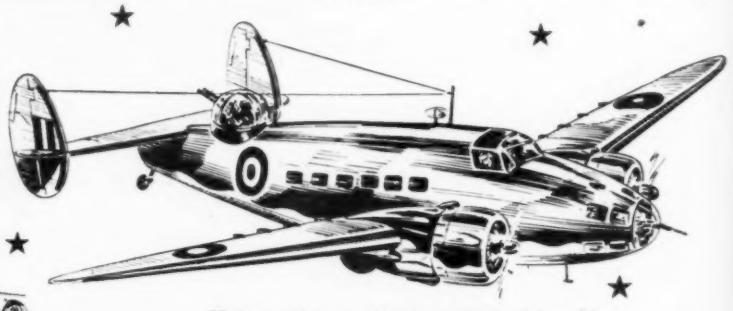

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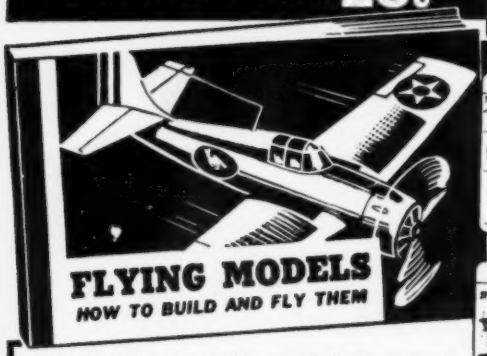

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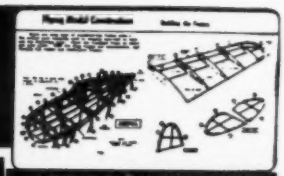
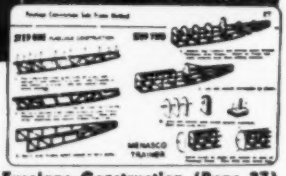


Frame Detail (Page 1)

Cardboard Formers (Page 19)



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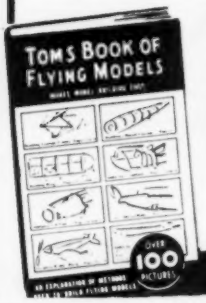


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## Modeling Your Future

*(Continued from page 43)*

model, taking off the detachable fin and stabilizer and substituting the new tail unit. Also remove the auxiliary fin so that your model appears as in Fig. 139. Now the lateral area is lowered to approximately the same position as Fig. 138 so let us see if flight is similar.

Adjust your model and launch it in the customary manner. The plane may turn gently but do not be surprised if it flies comparatively straight with perfect stability. If the first flight is successful and indicates proper plane adjustment, twist the tail unit slightly so the rudder points to the right approximately 2° in order to cause a left turn. Now fly the plane again, noting the degree of turn and the effect of turning the rudder. Bank will be excessive and flight similar to the flight of plane in Fig. 137. So we see that with neutral rudder setting, the plane is made spirally stable by lowering the fin and will fly straighter, while turning the rudder causes a sharply banked circling flight resulting usually in a spiral dive.

This is one of the puzzling reactions that causes model designers to revert to the trial and error designing method. The reason becomes clear, however, if the problem is given a little study. The point marked C.F.A. in Figures 137, 138, 139 and 140, represents the center of the side air pressure on the forward lateral area including wing, pylon, auxiliary fin, wheels and propeller. Point C.T.A. is the center of side area and air pressure on the tail surfaces. A line XY drawn through these two points is the axis of roll. The resultant of forces acting at C.F.A. and C.T.A. is the total side pressure, which acts at C.L.A. (center of lateral area).

Now let us study the flight in respect to these forces and points of reaction. In Fig. 139, the side pressure acts at C.L.A. in turns *when the rudder is "straight."* This point is only slightly above a horizontal line through the center of gravity and therefore the banking moment in turns is small as in Fig. 135, so the plane is spirally stable.

However when the rudder is turned to cause circling, to the left for instance, the side pressure on the fin is reversed, acting from the inside of the turn instead of against the right side of the fin. So the resultant side pressure no longer acts at C.L.A. but instead moves forward along axis XY to point C.F.A. This point is far above C.G. and therefore causes steep banking and spiral instability.

The pressure on the inside of the rudder also contributes to instability by causing a rolling moment about XY that *increases* the bank instead of reducing it.

So the plane in Fig. 139 is stable when rudder is straight but unstable and very sensitive to the rudder when it is turned.

With this information flight characteristics of the planes in Figures 137 and 138 can also be explained. The side pressure on plane 137 acts at C.L.A. when rudder is straight, which is well above the C.G. and therefore causes spiral instability. With rudder turned this plane would also be unstable but to a lesser degree because the side pressure on the inside of the fin causes a rolling moment *against* the bank.

On plane 138, the side pressure at C.L.A. is nearly on a level with C.G., so with neutral rudder it is stable. With turned rudder it is even more stable because the side pressure not only moves to C.F.A. close to C.G. but it also causes a righting moment about the axis XY, thereby adding to stability in turns. This type of plane is less sensitive to the rudder than any of the others and in some cases it is impossible to cause circling by turning the rudder. However, with rudder neutral it will turn readily due to propeller torque.

This is not true of planes 137 and 139. With rudder neutral these have little tendency to turn. The secret lies in the slope of the neutral axis XY. The plane in Fig. 138, with axis slanting downward turns readily under effect of propeller torque. Plane in Fig. 137 turns sharply only when the fin is turned. When the plane of Fig. 138 rolls to the left about axis XY the nose will point in the direction of turn. Consequently, turning is helped by the pull of the propeller. When planes in Fgures 137 and 139 roll to the left the nose points away from the direction of turn so the propeller pull acts against the normal turning tendencies. However plane 137 turns more readily than 139. In any case, planes of this latter design fly nearly straight and often even refuse to react to the rudder.

It is possible for designers to estimate this resistance to turning even before their planes are constructed by the slant of the axis XY. If it points upward at only a slight angle to the motor stick (thrust line) Fig. 137, resistance to turning will be slight. If the positive angle is excessive turning resistance will be


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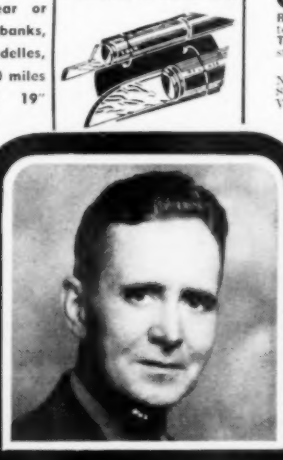

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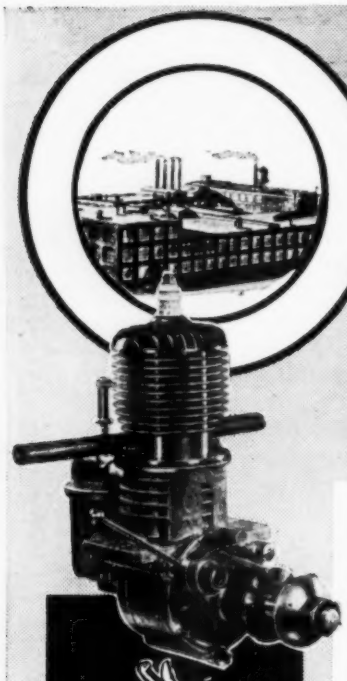

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great. So we see that this angle or slope of the axis is a measure of this tendency. For instance, the *downward* or negative slope of the axis in Fig. 137 gives this plane considerable turning tendency. High neutral fins cause sharp turns due to negative axes, and low fins broad sweeping turns due to positive axes and in some cases only straight flights, especially when used in conjunction with wing tip dihedral.

With one more test your experiment will be complete. Add the auxiliary fin to the setup shown in 139, so the plane will appear as in Fig. 140. With this combination the center of lateral area has been lowered to a point C.L.A. located approximately as shown in the figure. The rolling axis XY is also indicated. The C.L.A. is lower than in other cases and the axis is slanted slightly less than shown in Fig. 139. So we can expect that this plane will bank very little if at all in sharp turns, due to the low C.L.A. and that turning tendencies on the whole will be slight but more than with plane 138 caused by less angle between XY and the line of thrust.

After adjusting this model carefully for gliding and power flight, test fly it, checking carefully the raction of the model in light of what might be expected of it due to the lowered C.L.A. and positive slope of XY. It will be stable in turns because C.F.A. is close to C.G. but less stable than plane 138 because the fin is low.

Plane 138 will prove to be the most stable and controllable type under all conditions and consequently is especially adapted for contest work: plane 139 is even more stable when rudder is neutral but less when turned. Contest planes, of course, need not be of these particular side outlines. Any desired outline may be used as long as the position of the center of lateral area and the slope of the axis XY remain the same.

These two design factors being mathematical and not visible to the eye are unsuspected by many model builders and so are overlooked. In designing many airplanes first establish the center of lateral area, the center of gravity and the axis XY in the desired positions. Then draw the side outline of your model around these fixed design factors. Care must be taken in drawing the design so that XY actually will be the axis of the lateral area and that C.L.A. will be its center.

This may be determined by tests if desired by cutting out a cardboard pattern of the model's side view, adding double thicknesses of cardboard at the wing elevation which is required because there are two wing tips, so this elevation is doubly effective. Then balance the pattern on the point of a pin determining the exact point of balance. This point will be the center of lateral area. If, after test, it is not in the desired position, add or take away a little area here or there until the final correct design is established.

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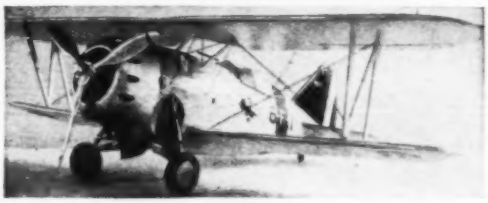

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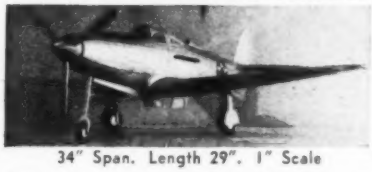

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## The Streamliner!

*(Continued from page 11)*

Pin down the bottom spar and trailing edge. Don't pin the T.E. down flat, but jack up the front side with some pieces of 1/32" sheet slipped under about halfway. Cement all ribs in place, making the No. 1 ribs lean over about 5/32" for dihedral, then the leading edge and top spar. Bend 1/16" square bamboo around a candle flame for the wing tips and cement these in place. Remove the frames from your drawing when dry and sand the L.E. and T.E. to shape. Cover the L.E. top and bottom with very light 1/32" quarter-grained balsa, always starting to cement to the spars first and then toward the L.E. Again sand the L.E. to shape and join the wing halves, cementing the dihedral brace in place with a patch of silk.

Cover the undercamber with tissue first, tacking the tissue to each rib with dope and then cover the top and spray with water to shrink the tissue. Finish with two or three coats of dope.

TAIL ASSEMBLY: Cut out two tails, with the rudder templates, from 1/16" medium, quarter-grained sheet balsa. Sand the outer side of each to give a streamline section, tapering near the top, but thick at the bottom. Cover each with tissue and dope two or three times. Add a cement skin as shown, for tail skid purposes.

Stabilizer construction is similar to that of the wing. Remove the tissue from the rudders where they are to be cemented to the stab. and cement them on. Remove the tissue from the balsa parts on the bottom of the stabilizer where it is cemented to the fuselage and cement it to the balsa platform of the fuselage. Be sure you don't put any turn in the rudders when doing this.

PROPELLER AND FITTINGS: Obtain a block of medium balsa, 15" x 2" x 1-1/2", which has the grain running parallel to the 2" side. This will make grain of both blades the same. Drill a 1/16" hole through the center and saw the block to shape shown on the plans. Carve the prop in the usual manner, leaving the hub thick. Have about 1/8" undercamber in the blades and give the tips an elliptical shape. Give the prop its final shape by sanding with rough, then finer and finer sandpaper, ending with 10 nought or 400 Wet or Dry carborundum paper. The prop should now be about 3/8" wide at the hub, 3/16" to 1/8" thick at the blades and 3/32" at the tips. Finish with two coats of thin cement and three coats of dope, sanding after each coat with 400 Wet or Dry paper. Cement on two bent large-face bushings and cut off both blades cleanly with a thin razor blade. Drill 1/16" holes in the hub at the angles shown. Make sure these angles are correct or the prop will not fold right.

Bend all the wire and brass fittings shown on the plans. Push the brass hinge bearings into the balsa over the

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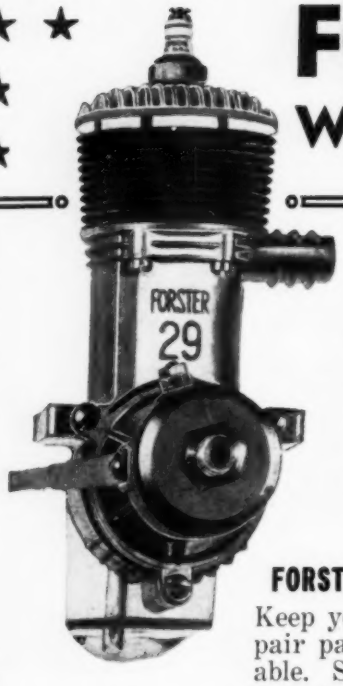


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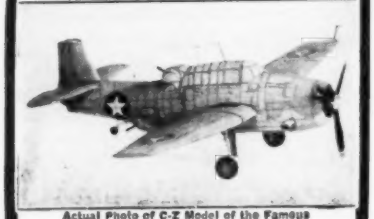

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holes in the hub, cementing them in place. Cover the bearings and surrounding wood with a small patch of crinoline or silk.

Now pin the hinges to the blades and attach to the hub temporarily. Test for proper folding and make any necessary adjustments. It may be necessary to round the rear corners of the hub. When everything works smoothly glue the hinges in place, also clamping small wire U's into the wood over the hinges. Here again, use a patch of crinoline or silk for reenforcement.

From medium balsa carve the nose block to fit the fuselage contour. Make it fit the fuselage snugly. Cement large-face bushings to the plug for the prop shaft bearings. Slip the prop shaft through the plug, two 1/4" flat washers, the tensioner spring, two more washers and the prop. Bend the shaft over the hub and cement it in place using a wire U and a patch of crinoline.

The tensioner stop is a collared hook screw with the hook clipped off. Screw it into the nose block in such position as to make the prop stop in a horizontal position.

The tail plug is made of very light balsa. Push the tail hook through, bend it to leave loop for winding and cement it well. Cover both prop and tail hooks with cambric tubing.

ASSEMBLY: Make a 30" motor of 16 strands of 1/4" flat rubber (40 feet of rubber). Lubricate it well with a mixture of green soap and glycerine. Tie rubber bands around the ends to prevent tangling. Attach the tail plug, slip through the body and put on the prop. "Lock" the prop hook by tying the hook end to the prop shaft with a rubber band. This also forms the arm for stopping the prop.

The nose plug is held in place by a rubber band strung from the landing gear over the fuselage.

The wing is held on with several rubber bands.

FLYING: The model should balance near the wing trailing edge and should climb and glide to the right. Give the rudders about 1/8" right turn but warp *washout* into the *port* wing and stabilizer half. Glide the model and adjust with incidence and turn till it glides perfectly. Use about 1/16" right and down-thrust and try a few winds. Adjust with the thrust line only until it climbs smoothly. Increase the power as long as everything is O.K. and try to adjust mostly with the thrust line.

About 700 turns is the maximum one can get. The best procedure in winding is to take the tail plug and nose plug out and let the model hang on the rubber. "hold" the motor just put two fingers around the prop hub and hang on while the rubber is stretched and wound by a winder hooked to the tail plug.

Here's hoping you don't lose the ship on its first flight!

VICTORY

## Air Ways

*(Continued from page 31)*

lives at 1015 Elizabeth Street, Pueblo, Colorado, says that the job has a flying weight of 3 lbs. 4 oz., and a wing span of 66 inches. Speaking of model activity near Pueblo, Colo., Ed says that he is still able to get gasoline and SAE 77 oil for fuel solution but he can't find any 1-1/2 volt dry-cells. He states that there used to be considerable model activity in Pueblo, even to the extent of having a model field, but that everyone seems to have gone into the armed forces. He hopes that presentation of his model will arouse some interest in the area and that other modelers will get in touch with him. We hope so too, Ed. How about it, fellows?

Watt Greer, of Rocky Mount, Virginia, sends in picture No. 11 of his scale Curtiss F11C-2 Navy fighter which is complete in every detail, including movable controls, bucket seat and a miniature pilot carved from balsa. Watt states that he is entering the Army Air Forces and that if it hadn't been for his model building background, he doesn't believe he would ever have made it. There's a lot of hot pilots in action the world over to agree with you, Watt!

Private James A. Reynolds gives a few hints about construction in connection with his original U-Control speedster, shown in picture No. 12. This job is powered with an Ohlsson "60" and has been flown with both a 10" and 12" propeller. The span is 23" with the wing

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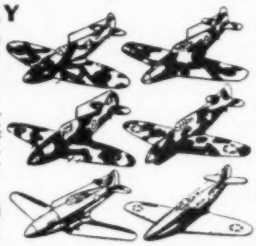

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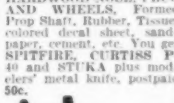

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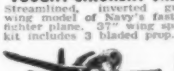

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cut from solid balsa and the length is 27". The plane was built in two sections split along the horizontal centerline. The upper shell included the wing, and the lower shell mounting the tail surfaces, the motor and the landing gear. He says: "The cowl is formed with surgical gauze and glue on wood formers. This method is really super in my opinion for all types of cowls, ventilators and all fittings. It doesn't take too long and is really rugged if done right." Jim has put away his model building for the duration but hopes to get back to active building "as soon as a mighty big job has been done."

Picture No. 13 shows the latest masterpiece of the gliding Zaic boys, who certainly need no introduction. (See Frank's article on the subject on page 25.) The beautiful glider shown can take both tow and cata-tow but the rubber has to be extra long for decent flights. Short rubber puts too great a load on the structure and is liable to cause failure of the wing spars. The "V" tail has proven satisfactory from a stability point of view although the one shown made the glider wobble slightly. An increase in dihedral rectified the trouble and it is now an excellent flier. Bernie Schoenfeld is now working on a 6' model, after which it is planned to build a 100" job. The one shown has a 50" span. The tests are to determine if the basic design will prove satisfactory regardless of scale. Let us hear how you make out, fellows.

## NEW EDUCATIONAL RESEARCH COMMITTEE APPOINTED

C. W. Rogers, president of the Model Industry Association, has appointed an educational research committee consisting of: E. T. Pachasa, R. Mair, W. Bibichkow, J. Ott, I. S. Polk, P. K. Guillow, H. L. Johnson.

The committee's task is to prepare a list of recommendations specifying educational requirements in model aircraft kits. The objective is to make model airplane kits as educationally sound as possible. The committee has embarked on a two-fold plan, one comprising an immediate program, and the second a long-range program.

Leading educators hail the building of model airplane kits as an important adjunct of air age education. However, model plane building must not merely teach handicraft, but should be directly instrumental in teaching the builder something about nomenclature, aerodynamics, theory of flight, air age geography, physics, mathematics, aerology, meteorology and mechanics. This sounds like a formidable list of subjects but model plane building touches more or less every one of these.

### Club News

News from the clubs has been scant this month and we wish to renew our permanent request for news of model club activities. We are fully cognizant of the drop in club memberships and the consequent drop in the number of contests. However, those of you still on the job must shoulder the responsibility of your clubs in the absence of the greater portion of the members and, in many cases, the officers, and keep alive the spirit of the organization so that the boys will have something real and genuine to come home to.

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### New Jersey

The Union City Aeroleers would like to be informed of any gas model clubs in Hudson County, New Jersey, who would be interested in collaborating to stimulate gas model activity in that area. If any clubs or individuals are interested, write to Joseph O'Grady, 1402 14th Street, North Bergen, New Jersey.

Mr. M. Avery, 1034 Bloomfield Street, Hoboken, New Jersey, would like to get in touch with anybody interested in U-Control flying in that vicinity.

### California

The East Bay Aeroneers Association of Berkeley, held an Original Design Contest, limiting contestants to ships designed and built since Jan. 1st, 1943, to the 1941 A.M.A. rules. The results:

Class A
Jack Dyer. 21:59 1/2 total 3 flights.
Jack Burke. 3:03 total 2 flights.
June Dyer. :43 1/2 total 2 flights.

Class B
Dick Pettinger. 1:40 total 2 flights.

Class C
Howard McLaughlin. 15:21 total 3 flights.

VICTORY

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It takes only a little practice to fly as many as four Whip-Power planes in formation. With a little more practice you can do realistic combat flying, performing the acrobatics of a veteran fighter pilot. This teaches split second timing and creates the self-confidence so essential in actual flying.

***Whip-Power Models Delayed***

The heavy demand for the Airacobra Whip-Power model, together with the increasing production of target planes for the armed services, has forced us to delay production of Mustang, Warhawk and Wildcat Whip-Power models, as well as the Firecat U-Control plane. These will be produced as soon as possible.

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A 10 min. limit was used in all contests. It is interesting to note that June Dyer is the mother of Jack Dyer and the team is always on hand with their models.

Results of the August monthly contest:

| Contestant | Class A | Total |
|---|---|---|
| Jack Dyer | "19" | 10:59 |
| Blair Hamilton | Micro. | 3:26 |
| Bob Riley | Atom | 1:01 |
| | **Class B** | |
| Al Cope | "29" | 10:47 |
| Chas. Hubbard | "29" | 7:14 |
| Poulin | "23" | 5:58 |
| | **Class C** | |
| Mr. Cadwell | "60" | 15:00 |
| Paul Romak | Cyk | 12:14 |
| Les Martin | Thermite 36 | 11:57 |

The Fresno Gas Model Airplane Club descended *en masse* on the Porterville Lindsay Contest and returned home with the bulk of the prizes, including all the first prizes. There were 1,000 persons in the audience, which is a fair indication of the interest shown on the West Coast. A five-minute time limit was used. The results follow:

| | |
|---|---|
| Class A | |
| Wm. Winter, Fresno | 494 Sec. |
| Joe Menezes, Hanford | 421 " |
| Jack Ruf, Porterville | 102 " |
| Ocie Randall, Fresno | 97 " |
| Jack Bognar, Porterville | 81 " |
| Class B | |
| Wm. Dunham, Fresno | 698.5 Sec. |
| Dutch Van Tassel, Fresno | 559.8 Sec. |
| Wm. Winter Fresno | 554.4 " |
| L. A. Snyder, Oildale | 324.0 " |
| Kirk Hale, Bakersfield | 296.5 " |
| Class C | |
| Jack Soldani, Fresno | 900 Sec. |
| Eugene Edsell, Porterville | 600 " |
| W. A. Achterderg, Visalia | 600 " |
| Ted Dice, Fowler | 554 " |
| J. R. James, Fresno | 497 " |

### Virginia

The Brain Busters Model Club of 32 Armistead Ave., Hampton, Virginia, are holding a seaplane championship meet on Sept. 19th, and prizes include eight war bonds and $280 worth of trophies.

With a 10-second motor run, the results of the recent gas contest proved Frank Parmenter, club president, the winner.

Flying an Ohlsson "60" powered Swoose (Chicago design) he got 9:08 to win first in C, and with his Forster Swoose he got 3:42 to win second in AB. Spencer Cardwell won 1st in Class AB with a time of 4:20; he was also flying a Forster powered Swoose. Tom Able was third in AB, flying a Cannon ship of his own design, time 2:52. Second in C was a Florida boy, George Sadler, with his design—a Lord Beaverlook, time 6:39. Third in C, Herman "Tex" Weber of Texas, with his old reliable 60 Playboy. "Tex," by the way, was Long Island champ in '42. The Swoose is about the most popular design here and dominates in most contests.

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| | |
|---|---|
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| Hawker "HURRICANE" 17½" | 2.50 |
| Gloster "GAUNTLET" 17½" | 2.50 |
| Ryan "STM-2" 17" | 2.50 |
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## Carrier Fighters

(*Continued from page 7*)

over the end at 39 miles per hour, crossed eleven of the lines and finally touched the deck as lightly as a feather, the wheels dragging the lines. It came to a halt with still 50 ft. to spare! Now, truly, the aircraft carrier was a practical adjunct of the fleet, harbinger of future wars and aerial strength. Again, Ely received nothing for his flight and this immortal civilian pilot, who died in a crash at Macon, Georgia in the autumn of that year, lives in history's pages as the father of carrier aviation. In 1935 Congress awarded him, posthumously, the Distinguished Flying Cross for his services to aviation.

The Navy Department appropriated $25,000 for Chambers to use for the purchase of equipment and the training of aviators. Lieutenant John Rodgers was ordered to Dayton to study flying from the Wright brothers and Lieutenant John H. Towers was sent to Curtiss for flight instruction. Greenbury Point, near Annapolis, was set up as the first official Naval air station and Ensign V. D. Herbster joined Ellyson, Rodgers and Towers as the Navy's first aviators.

Two Curtiss and one Wright machine were purchased in the late Fall of 1911 and United States Naval Aviation was born. The World War brought an expansion of equipment and men and the Armistice on November 11, 1918 found Naval Aviation with 21 air stations, 2,800 officers, 30,000 enlisted men and 3,880 student pilots in training.

We touch upon this World War period lightly insofar as it was a period largely of flying boats, rather than carrier fighters with which we are concerned here. Almost the whole of Naval Aviation flying personnel were flying boat pilots and few had even been in the air in other than seaplanes!

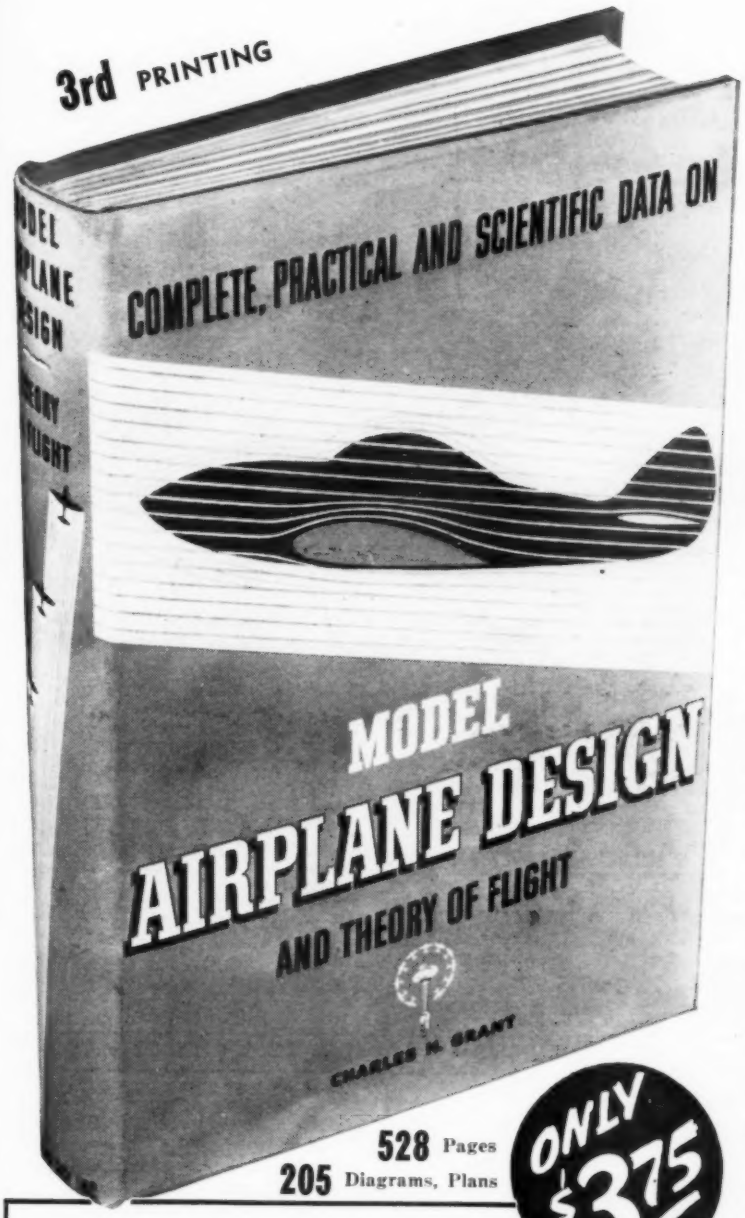
With the coming of peace came the aircraft carrier, or rather its first conceptions for, although Ely's flights in 1910 and 1911 had proved the practicality of landplane-ship operation, the war had placed an emphasis on flying boats due to the Navy's tactical assignment of anti-submarine work throughout the war. However, a flight deck was built on the forward turret of the *U.S.S. Texas* prior to the Armistice. The *U.S.S. Mississippi* was so equipped shortly afterwards. Our sea-going aviators were turned over to the Army for land plane training, so inexperienced were they, and 15 pilots received such instruction at Carlstrom and March Fields under Army tutelage. The Army loaned 30 small landplanes (World War Sopwith Camels, 1½ Strutters, Nieuports and S.E.-5's) to the Navy for their experiments and the *Pennsylvania*, *Arizona*, *Oklahoma*, *Nevada* and *Idaho* were equipped with flying platforms atop turrets. In addition a 100-ft. platform was built on a coal barge at the Washington Navy Yard and deck operation experiments progressed.

It soon became evident that these small platforms were not the answer and the old collier *Jupiter* was authorized by the Secretary of the Navy to be outfitted with a flight deck. In the Spring of 1922 the ship, re-commissioned as the *U.S.S. Langley*, was completed and in October the Navy's *first* aircraft carrier steamed to sea with a lone plane perched on its flight deck.

Lt. Commander V. C. Griffin raced down the runway and into the air to become the first naval aviator to take off from an aircraft carrier on October 26, 1922. Lt. Commander G. de C. Chevalier took off from Norfolk in an Aeromarine landplane and touched down on the *Langley*, his plane ending on its nose, its tail in the air, to become the first naval aviator to land on an aircraft carrier. With these two flights, the carrier fighter of today became a reality!

The *Covered Wagon*, as the *Langley* became known, was the center of myriad experiments in carrier fighter operation and much of its modern science was first developed on this famous ship. In 1937 the *Langley*, which, aside from her aircraft fame, was also renown as our first large electrically-driven vessel, was converted into a seaplane tender (with 40% of her flight deck removed) and has since been sunk.

(*Turn to page 57*)

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The Curtiss TS-1 was the first navy carrier fighter to be designed around a navy specification and was the first of a brilliant line of Curtiss carrier fighters that is still unbroken. The Boeing FB-1, developed at the same time, started an unbroken string of progressively improved carrier fighters that ended in 1935 when the giant firm developed an interest in four-engined monsters that resulted in the famed *Flying Fortress* bomber.

The carrier fighter is one of the most difficult types of airplane design and there are many problems peculiar to it that are not found in other types. These problems have made the road a rocky one and possibly more carrier fighter design failures have been recorded than all other types combined. The solution to these problems resulted in many wierd designs which were not accepted for production and many that were ordered in small quantities proved inferior for their intended tended purposes.

The dominant design criterion for a carrier fighter is a short takeoff runs, necessitated by the carriers' short decks. Another requirement is a short wing span to allow the storage of a required number on a single deck. These two requirements are opposed to one another, since the first demands a low wing loading achieved by a large amount of wing area and the second demands a small wing area. The solution to these problems was the use of two wings, both short, which permitted the required wing area and yet provided a small wing span. Low wing loading is also achieved by light gross weight of the airplane, demanding small, lightly constructed planes. These features have distinguished carrier fighters for many years; small, light biplanes.

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Of MODEL AIRPLANE NEWS, published monthly at Mt. Morris, Illinois, for October 1, 1943.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Jay P. Cleveland, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Air Age Inc., 551 Fifth Ave., New York 17, N.Y.; Editor, Robert McLarren, 551 Fifth Ave., New York 17, N.Y.; Managing Editor, Robert McLarren, 551 Fifth Ave., New York 17, N.Y.; Business Manager, Jay P. Cleveland, 551 Fifth Ave., New York 17, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Air Age Inc., 551 Fifth Ave., New York; George C. Johnson, 551 Fifth Ave., New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.) None.

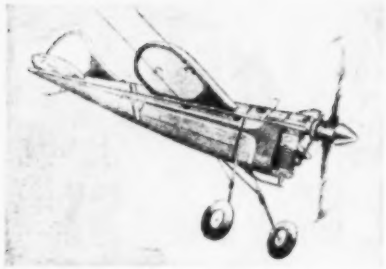
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is (This information is required from daily publications only.)

JAY P. CLEVELAND, Business Manager.

Sworn to and subscribed before me this 11th day of September, 1943.
[Seal] (My commission expires March 30, 1945.)

RUSSELL H. UNRUH, Notary Public.



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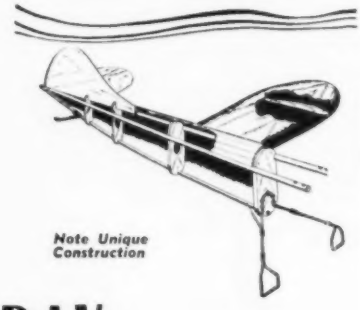

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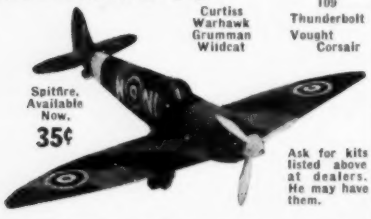

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development of a single manufacturer, rather than the chronological appearance of planes by several firms. The Curtiss TS-1 was a biplane single-seater powered by an air-cooled engine. This ship was later redesignated the F4C-1 with an all-metal structure. The F5C-1 was a further development and the F6C-1 was a new design powered by the water-cooled Curtiss D-12 engine which was banned from the service with the F6C-3 and the F6C-4 was powered by the new P&W *Wasp* engine. The F6C-5 appeared with improved landing gear for deck landing shocks and the F6C-6 was an experimental racing plane built for the Navy's participation in the 1930 National Air Races. A monoplane, the racer was powered by the D-12 engine and was piloted by Captain Page, who met his death when the craft touched a wing to the ground while rounding a pylon at full speed and was demolished. This ended the Navy's participation in air racing which included the international Schneider Trophy races and the Pulitzer races.

The Curtiss F7C-1 was powered by the P&W *Wasp* engine and became a popular ship with Navy flyers due to its maneuverability and consequent adroitness at carrier landings and takeoffs.

With the Curtiss F8C-1 the Navy experimented with a two-man carrier fighter, the craft being somewhat larger than the previous fighters and carrying a second crew member armed with a movable .30-caliber machine-gun mounted on a special swivel mount. Powered by the famous *Wasp* engine, this model was developed through the F8C-5 and the F8C-6 tried out the Wright *Cyclone* engine of 575 horsepower, more powerful than the 450 horsepower *Wasp*.

The F8C-4, known as the *Helldiver*, became a fixture with the fleet and it was largely through the success of this airplane that the Navy was able to pioneer dive-bombing. In this tactic the Navy perfected a terrible aerial weapon which is now its most powerful weapon against enemy fleets. Our naval successes in the Southwest Pacific can be directly attributed to the Curtiss F8C-4 *Helldiver*, the pioneer of dive-bombing. The F8C-7 was a special command ship designed for the use of high ranking officers desiring speedy inter-fleet transportation. It was luxuriously appointed and featured the official blue and white trim with the gold stars of the occupant emblazoned on the sides of the fuselage.

The F9C-1, the first of the gull-wing fighters, was originally designed as a carrier fighter but was quickly adapted for a far different purpose. The development of the lighter-than-air craft by the United States Navy has been historic and is an extremely interesting one but can be dealt with here only to the extent of noting that the F9C-2 *Sparrowhawk* was fitted with a special dirigible hook on its top wing and became famous for its airplane-to-dirigible operations with the famed *Akron* and *Macon* airships.

The F10C-1 was an experimental model that was discarded in favor of the F11C-1, the most popular of all Curtiss carrier fighters. Powered by an experimental Wright *Twin Whirlwind* double-row engine, it pioneered in power plant develop-


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ment. For service use, however, the F11C-2 was powered by a Wright *Cyclone* engine and large quantities saw duty with the carriers. The F11C-3 featured a retractable landing gear, first to be used on a carrier fighter. These latter two models were redesigned into a more deadly plane with the addition of wing bomb racks and were designated BFC-1 and BF2C-1, the latter being used widely and furthering the Navy's bomber-fighter experiments. Further Curtiss experimental carrier fighters were monoplanes, the XF12C-1 being a two-seater and the XF13C-1 being a high-wing monoplane single-seat fighter. Although not purchased by the Navy, the later design was not a loss for it was developed into the popular Curtiss O-52 observation machine now in use by the Army Air Forces. A Curtiss XF14C-1 fighter is now under development.

After the success of the Boeing FB series, a new design was produced in the F2B-1 which was quickly adapted into the F3B-1 fighter which saw wide service with the Navy. It was this type that gained fame as the *Three Sea Hawks*, a Navy acrobatic team composed of Lieuts. Tomlinson, Storrs and Davis, which thrilled spectators at the National Air Races by tying their planes together with lines and performing intricate maneuvers.

The Boeing F4B-1 set the style for tiny carrier fighters and was by far the smallest developed. Successful from the start, the F4B-2 was developed and the F4B-3 became standard carrier equipment. With a new vertical stabilizer it became the famous Boeing F4B-4 which for many years characterized our carrier decks. This was the last successful Boeing design, although experimental KXF5B-1 (monoplane), XF6B-1 (biplane) and XF7B-1 (high speed monoplane) were developed. Boeing has since dropped its Navy fighter design in favor of four-engine aircraft exclusively.

Grumman skyrocketed into the picture in 1935 with the appearance of its stubby-winged F2F-1 fighter, one of the fastest in service at the time. Its first fighter design, the FF-1, was a highly successful two-seater biplane which was redesigned into a scout plane as the SF-1, a duty which it performed well for more than four years. A quantity of F2F-1 fighters, powered by P&W *Twin Wasp* engines, saw service but its extremely short length necessitated additional fuselage which was provided in the F3F-1. This design became standardized by the Navy and was used throughout the carrier squadrons. The F4F-1 was a radical departure from previous carrier fighter design and became the first successful monoplane carrier fighter to see duty with the fleet. High lift devices lowered landing speeds and shortened takeoff runs to an extent that monoplanes could be designed for carrier use with their advantage of high speed, as compared with the biplane types. This plane will long re-

*(Continued on page 60)*


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## Transatlantic Cargo Glider

*(Continued from page 28)*

looped up and brought through, then soldered. The wheel is a 3/16" flat bead. The whole assembly is forced into the bottom of the ship directly under the hinge line of the rudder.

To assemble the wings to the fuselage keep the wing tips raised 1/4" above level for the incidence. Note the angle and drill two 1/8" holes at this angle into the fuselage centersection. Drill two 1/8" holes into the inboard side of the wing panels. Place dowel sticks in them. Push the wings against the fuselage. The pegs should fit and line up the holes made for them. Now check the incidence. Glue the wings on.

For the stabilizer halves use wire as above for pegs. Glue them against the fuselage. The stab rides flush with the top of the fuselage tail. Note there is a space between the elevators and the fuselage from the hinge line back. Install the dorsal fin at 90 to the stab.

Sand the whole glider with fine sandpaper. Get it smooth. Use a wood filler, two or three coats, and sand between each coat with 6-0 or 10-0. Additional coats are sanded with $\frac{360A}{W/D}$ and 400A.

The wire fittings on top of the windshield are the nose lift cable tripot and pitot tube, the Venturi tube and the tow gear in the center. The windshield itself is made of narrow strips of masking tape pressed on.

The tripod is made of 1/32" wire bent to a Vee and inserted into the wood at an angle leaning forward. The cable is a piece of wire placed at an angle behind the tripod. There is a third leg running from the top of the Vee downward to the front of the windshield. On this leg, the pitot tube is soldered. It is made from a Tee-shaped bank pin, with the pin shank bent backward hook shape to resemble a cooling vane. The tow gear is made from a piece of 1/8" dowel about 1/4" long, tapered off to lay flush back against the contour of the windshield. Bend a small pin and insert it into the diameter of the dowel to resemble the tow ring. This tow ring can be released by the pilot from inside the ship when necessary.

The Venturi tube is an 1/8" brass bushing, flared a bit and fastened with a piece of steel wire running through the opening and stapled into the wood body.

The stabilizer has eight guy wires or tie rods as they are known. The top of the wings at the ailerons have bent wire angles to represent the push rods that operate them.

The struts are made of 1/8" and 1/16" dowels. The jury struts that support them are short pieces of steel wire pushed into the wings, then cut to fit and glued. These are handled with tweezers.

Scratch-mark the outlines right on your model for the wing junctions, ailerons, tabs, trimmers and elevators. Also the body junctions, nose to center, center to tail, main and emergency doors, portholes and ventilator buttons. For the buttons force pins into the fuselage and let the heads extend out about 1/32". There are five on each side. The portholes are 3/16" brass tubing forced into the fuselage. See that the brass wall is thin for appearance sake.

Note that there is only one trimmer on the inboard side of the right aileron. The two narrow rectangles in the center of the wing panels are spoilers.

Now for the final finish. Use a ground coat after the wood filler; it gives a grip base for the color coats. The color coats, two of them, are U. S. Army O. D. All paints used are colored dope. Sand between each coat with a 360 A W/D and 400A. Leave the last coat dull, do not sand it. Now put on the decals, which can be purchased at the model shop for 15c. The main wing insignias are 1-1/8" in diameter. There are two of them; one goes on the bottom right outboard and the other goes top left outboard. The tail stars are 1/2" in diameter and both go on opposite sides of the tail up near the tail junction point of the fuselage.

VICTORY

## Carrier Fighters

*(Continued from page 59)*

main in naval traditions and it will be quickly recognized as the famous *Wildcat*, which has played such a vital role in the South Pacific in action against the Japs. The F5F-1 was a radical twin-engine navy fighter which was the fastest airplane in service any place in the world upon its appearance. However, it was not purchased due to its high landing and takeoff speeds. The latest Grumman fighter, the F6F-1 is known as the *Hell-*


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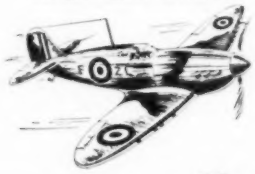

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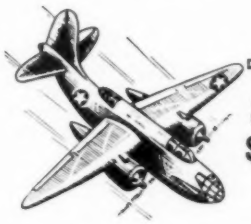

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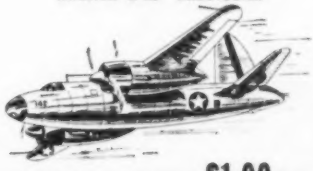

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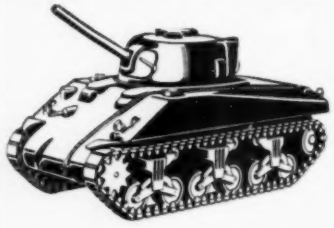

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The F4U-1 followed in 1939 and was one of the fastest and most powerful craft of its type ever developed. This is the standard carrier fighter now operating from our mighty carrier fleet and its successes against the Jap Zero fighter are too well known to bear repeating. The *Corsair* is fully described on page 27.

Modern Naval Aviation carrier fighters are the finest ships of their type in all the world and they are the culmination of thirty years of unstinting effort on the part of the *Bureau of Aeronautics* in particular and the Navy Department as a whole. When the entire picture is surveyed, as we have done here, something of the sacrifice and attention to duty that has characterized our Naval Aviation service's development of sea-going airplanes can be grasped. It has been a long, bitter task, fraught with despondency, failure and despair. But today's modern U.S. Navy aerial armada is a tribute to all those officers and men who remained firm in their faith in its ultimate strength and power. Today's Naval Aviation carrier fighters are the *best* in all the world!

VICTORY

## The Vagabond

*(Continued from page 17)*

to the top longeron. The 3/16" sheet wing mount is glued to the top of the pylon and F2. Small 1/8" sheet braces are cut and glued in position to reinforce the wing mount. (See sketch on Plate 1.)

You will notice that the ignition, with the exception of the battery box, is completely enclosed in the fuselage and cannot be tampered with without cutting away some of the balsa covering. This means a perfect ignition must be installed. The coil, on a balsa mount, is glued against the front of F2 for proper balance. All connections should be soldered and made with a good grade of stranded wire.

Cover the fuselage with 1/32" sheet to the rear of F3, covering over the battery box. Cut out the opening later. Glue the lower nose block in place and hollow out to permit the motor to swivel. Shape the outside of the block. At this point glue the 1/4" sheet sub-rudder and wire wing hooks in place. Sand the entire fuselage.

The pylon is covered with wet silkspan or silk. The rest of the fuselage is covered with wet silkspan. The author found red to be the choice color, since it can readily be seen against both sky and ground. However, since only white silkspan was obtainable the author dyed this with red curtain dye. Try it, its swell!

WING: First draw wing plan to full size. Note that the wing has no taper and the tips are perfect half circles that may be drawn with a 4" compass radius). The ribs are spaced 3" apart. Cut out 13 ribs to the size given in the plan. Since the ribs are identical, place them in a vise and sand as a unit. Do this before cutting out the notches. Next cut the wing tips out of 3/16" sheet. The tips are then glued to the 3/16" by 3/4" notched trailing edge. Allow to dry. Place this on plan and pin down trailing edge only. Put ribs into position. Elevate the 1/4" square pine leading edge 3/16" off the plan and glue to ribs. Now raise the front of the wing tip to meet the leading edge and glue in place. Whey dry remove from plan and crack joints for polyhedral. Then put in 3 spars and brace the center spar with 1/8" plywood gussets at the joints. Cover the leading edge of the wing up to the top spar with 1/32" sheet balsa. 1/32" by 1/4" capstrips are added on the top and bottom of all ribs. Note that the capstrips terminate at the trailing edge. A small piece of pine fitted into the center of the trailing edge acts as a reinforcement against chafing by the rubber wing tie.

Thoroughly sand all parts of the wing and cover with double tissue or silkspan. However, if double tissue is used be sure to cross the grain of the layers.

STABILIZER: Here again simplicity was maintained to the greatest extent. Since the elevator is a perfect ellipse with its major axis on the spar it will not be necessary to make a squared-off diagram of it. If the builder doesn't prefer the following method he may proceed to draw the elevator from the plan by enlarging it 4 times. However, the following is advisable:

Draw a straight line. Mark off the span of the elevator. Construct the perpendicular bisector of this distance. From the intersection of these two axis swing a semi-circle above the major axis with a radius of 2-3/4". From the same point swing another semi-circle below the major axis with a radius of 4-1/4". Divide radius into any number of parts and semi-span into a corresponding number of parts. With dividers take distance "AB" and lay off on elevator plan as labeled. Mark off the points as shown. Complete with a french curve for the tips and a slightly bent strip for the rest.

Note that the elevator has a lifting section. The airfoil in this section is not critical and is constructed very simply. The main spar is 3/16" by 5/8" and tapers to the tip as shown on the plan at which point it is 3/16" square. The taper is from the top, the bottom of the spar remaining flat. The outline is of 3/16" sheet, and all the ribs are 1/16" sheet.

*(Continued on page 64)*

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## The Vagabond

*(Continued from page 62)*

The leading edge is hard 1/4" square.

After the main spar is shaped, pin it to the plan. Cut the tip and trailing edge outline to shape and pin to the plan. Add the leading edge and cement all joints. Ribs vary in camber according to the taper of the spar. These ribs are only as high as the spar and are cut in two pieces, one extending from the leading edge to the spar, the other from the spar to the trailing edge. Do not form them until they have been cemented in place and the cement has thoroughly dried. After it has dried take a sanding block and a little elbow grease and sand the ribs to shape. Note that the finished product is a slightly lifting airfoil.

RUDDER: The rudder is conventional. The outline is 3/16" sheet and the spars are 3/16" square. When the assembly is dry sand the leading and trailing edges to a streamlined section. Cement to the elevator after both units have been covered.

SWIVEL MOUNTS: Motor mounts are made of hardwood and are bolted to the pine crutch with a single bolt to permit the motor to swivel in the case of a hard landing. There is no necessity for a peg in the rear of the mount if the bolt is properly tightened. This will usually save the prop in the case of a rough landing.

COWLING: The cowling is drawn to scale making it necessary to enlarge the drawing. (Note) The cowling shown in the drawings is for a Bantam engine. Slight alterations may be necessary if another engine is used. The cowl is best carved from a single block. After squaring two edges, lightly glue the block against the fire wall and the motor bearers and shape the outside. Remove and hollow to a wall-thickness of 1/4" all around. A layer of tissue and several coats of colored dope finish the job.

FINISHING: Be sure to sand all exposed wood surfaces thoroughly before doping. The wing and tail require three coats of dope and the fuselage about five coats of dope. Colored dope is used on the nose block and silk pylon to insure oil-proofing.

FLYING: Glide the model several times, adjusting the rudder until a slight right turn is obtained. For the first power flight set the timer for ten seconds and use very low power. Under power the model should climb to the left and circle to the right. The only adjustment necessary may be a slight amount of down thrust which can easily be taken care of by loosening the two motor mount swivel bolts, tilting the engine and re-tightening the bolts.

If you have followed the instructions and made your adjustments carefully you now have a model that will afford you hours of enjoyment and an excellent chance in any contest.


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